Department of Defense Installation Watershed Impact Assessment Protocol

A Water Resources Management Guide

June 2005 Update

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14. ABSTRACT

The DOD Installation Watershed Impact Assessment Protocol is designed to assist installation environmental, operations, planning, and engineering personnel in responding to environmental issues, evaluating and prioritizing installation activities that impact a watershed, and in identifying P2 and/or mitigation solutions to correct or reduce watershed impairments caused by Army activities. The Protocol includes instructions for conducting a comprehensive assessment of the potential environmental impacts from installation operations in order to identify innovative and sustainable opportunities for mitigation and continuous improvement.

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DEPARTMENT OF DEFENSE INSTALLATION WATERSHED IMPACT ASSESSMENT PROTOCOL

A WATER RESOURCES MANAGEMENT GUIDE

JUNE 2005 UPDATE

DISCLAIMER

This Protocol is a guidance document developed to assist DoD installations and their partnering watershed organizations, citizen groups, federal agencies or off site municipalities with watershed-based planning. Though this guidance references statutory and regulatory provisions containing legally binding requirements, it is not a substitute for those provisions nor is it a regulation itself. Therefore, this document does not impose legally binding requirements on DoD and DoD installations.

This Protocol also refers to various websites, tools, databases, and general guidance from EPA, state, territories, local governments and watershed organizations which may provide useful information when developing watershed management plans. The referenced websites throughout this document highlight tools and resources to develop watershed management plans and is not a comprehensive listing of all watershed-based planning information. The DoD does not endorse any website, tool, or database or organization, which may be listed or contained herein.

This Protocol is primarily written for DoD installations that drain to or have the potential to affect, state designated impaired water bodies to assist them in developing a installation-wide management approach to mitigate point and non-point contaminant sources. However, DoD personnel can share the Protocol with partners such as onsite tenants or partnering watershed organizations, citizen groups, federal agencies or off site municipalities in developing a baseline watershed plan. Watershed organizations, municipalities or other entities using this Protocol individually or in partnership with DoD will need to make adjustments based on their organization or business characteristics (e.g. facility, activities, and land use).

Executive Summary

This is an update to the December 2002 Watershed Impact Assessment Protocol. It serves as both a guide and a reference to assist DoD installation environmental managers in complying with Total Maximum Daily Load (TMDL) and drinking water requirements. Specifically it is written for DoD installations that drain to, or have the potential to affect, state-designated impaired waterbodies. Major updates include

- conformance with the Army's *Strategy for the Environment*, the requirements of the Army's Environmental Management System (EMS), sustainability objectives, and other pertinent policy and legislation;
- consolidation of forms and automation of data collection fields; and
- review and update of websites and other available information tools.

The objective of this Protocol is to improve compliance by effectively identifying, assessing, and prioritizing installation site activities relative to the receiving environmental conditions (including water, air, and natural and cultural resources); to implement innovative technologies and sustainable design practices to mitigate current and potential environmental impacts before they have an effect on training; and to seek partnership opportunities whenever possible to reduce costs and leverage resources. In addition, the Protocol considers current and potential impacts from surrounding land-use owners—specifically what pollutant loads are draining onto or from the property.

The Protocol includes the following actions to assist installation environmental managers in conducting their own watershed impact assessment and corresponding watershed impact assessment action plan:

- Define goals and objectives that relate to the management of installation water resources, with a focus on conformance with the installation's EMS goals and objectives.
- Determine regulatory requirements associated with each water resource goal and objective.
- Identify installation activities and their aspects or impacts on water resources that can be integrated with EMS.
- Characterize the designated uses and the condition of the water resources on and surrounding the installation, including encroachment issues.
- Determine installation activities and land uses that may adversely affect all installation water resources, or just those activities that may contribute pollutants to waterbodies designated as impaired by a state's TMDL program.

- Prioritize proposed projects based on regulatory requirements, internal and external audits, and activity compliance status. For each project, determine cost-effectiveness to mitigate the target watershed (or waterbody) impairments and meet EMS and sustainability objectives.

- Evaluate, identify, and implement opportunities to integrate land use planning and environmental efforts into cost-effective management, conservation, and pollution prevention-based projects.

- Identify opportunities to reduce costs and improve program effectiveness by forming internal and external partnerships among installation offices, government organizations, land owners, citizen groups, and other stakeholders as part of an effective installation and community relation plan.

- Measure the progress of installation goals and objectives and adjust management direction as new information becomes available.

When the assessment is complete, installations will have created a watershed impact assessment action plan that includes the following items:

- A description of the designated uses for the installation's waterbodies and associated impairments.

- Baselines of installation land-use categories and activities, consistent with master planning, EMS, and public land use categories, that will assist planning and design efforts to reduce the installation's pollutant contributions to waterbody impairments and impacts on the general watershed health.

- A list of activities that may be affected, through permits or other means, by a state's TMDL implementation plan for an impaired waterbody, and those that contribute to specific watershed impairments (e.g., water quality, riparian buffers, or uncontrolled stormwater runoff).

- Project-based solutions that rely on the best science and up-to-date information on the applicability and effectiveness of stormwater best management practices, low-impact development solutions, innovative low-cost grounds maintenance practices, beneficial landscaping, and new operational procedures. The solutions will be presented in an easy-to-use format with all the necessary information (e.g., justification, benefits, regulatory driver, appropriate funding source, cost estimate, schedule, and potential project partners).

- A baseline of water resource goals, objectives, and activities to monitor progress over time, which can be integrated into the installation's EMS plan.

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Preface

Water resource management on DoD installations has evolved dramatically over the past 30 years since the Congress first enacted the Clean Water Act (CWA). Installation lands, facilities, infrastructure, and natural resources are now managed using proactive and holistic approaches to include watershed management concepts, low impact designs, and environmental management systems. In addition, installation managers have learned many lessons about what techniques actually work in the field and which do not. The goal for this Protocol is to compile these lessons learned into a single comprehensive document that is truly useful to installation managers, engineers, natural resource scientists, and master planners.

Over the past 15 years, the CWA and Safe Drinking Water Act (SDWA) regulations concerning water quality, effluent standards, and drinking water standards have grown at an exponential rate. In addition, initiatives and executive orders are directing DoD installations to apply a watershed protection approach to military activities and site management. This emphasis on watershed protection and the move by regulators to issue permits by watershed under the CWA will drive the requirement for DoD installations to evaluate the impacts of their activities on the quality and quantity of water entering a watershed. The Environmental Management System (EMS-ISO 14001) drives the need for DoD to further develop its own watershed management strategy, pollution prevention tools, and restoration plans.

As a result of this emphasis on compliance and watershed protection, the DoD CWA Services Steering Committee has developed this *DoD Watershed Impact Assessment Protocol: Installation Assessment and Planning Guidance.*[1] This Protocol targets DoD installation activities having the potential to contribute pollutants to impaired water bodies and/or drinking water sources on or near the installation. The objective of the Protocol is to provide DoD installation personnel with a multidisciplinary approach to assessing and prioritizing impacts of installation activities on a watershed, and, if necessary, provide them with instructions for developing a cost-effective management plan to mitigate those impacts. The content and functionality of this Protocol was developed by evaluating current federal and state watershed approaches and testing a model protocol at five military sites: the Army's Fort Stewart, GA; McAlester Army Ammunition Plant, OK; Marine Corps Air Station Beaufort, SC; Naval Station Mayport, SC; and Moody Air Force Base, GA. This Protocol emphasizes the use of low impact development projects, partnering opportunities, and guidance on project funding and execution, and it encourages the integration of existing geographical information systems, environmental management systems, and

[1] DoD Watershed Impact Assessment Protocol: Installation Assessment and Planning Guidance, December 2002.

future site master planning efforts. The end product can be used by installations as a tool to comply with current and future regulatory requirements while still achieving their DoD mission activities.

We would like to acknowledge the efforts of the many people who participated in the development and completion of this Protocol. In particular, we are grateful to those individuals from the staff at the Office of the Secretary of Defense Deputy Under Secretary for Environmental Security; the DoD Clean Water Steering Committee representatives from the Air Force, Army, Navy, and Marine Corps; participating installations (Fort Stewart, McAlester Ammunition Plant, Marine Corps Air Station Beaufort, Naval Station Mayport, and Moody Air Force Base); the Army Environmental Center; and the preparing contractor, LMI.

Chapter 1
Overview of the Watershed Impact Assessment Protocol

BENEFITS OF WATER RESOURCE MANAGEMENT TO INSTALLATION SUSTAINABILITY

Since the passage of the CWA and the SDWA more than 25 years ago, our nation has made significant progress in protecting and restoring the physical, chemical, and biological integrity of its waterbodies. Much of this progress is attributable to the control of point sources of pollution from industry and municipal sewage treatment plants. Although the achievement of national industrial and municipal point source compliance has been generally successful, many of our nation's streams, lakes, and estuaries are not clean enough to support uses such as fishing and swimming. This is due in part to non-point sources such as sediments, bacteria, nutrients, and metals. Runoff from urbanized areas and agricultural lands is the primary sources of these pollutants.

In an effort to further restore and achieve water quality objectives, the Environmental Protection Agency (EPA) and state regulators are accelerating implementation of the 1992 Total Maximum Daily Load (TMDL) regulations and managing water resources through a watershed management approach aimed at assessing the cumulative current and potential impacts to water resources from multiple activities rather than solely on a point source basis. This document provides easy-to-read guidance for Department of Defense (DoD) managers to conduct a comprehensive watershed impact assessment in conformance with EMS standards using existing plans and studies. The objective is to improve compliance by effectively identifying, assessing, and prioritizing installation site activities relative to the receiving environmental conditions (including water, air, and natural and cultural resources); to implement innovative technologies and sustainable design practices to mitigate current and potential environmental impacts before they have an effect on training; and to seek partnership opportunities whenever possible to reduce costs and leverage resources. In addition, the Protocol considers current and potential impacts from surrounding land-use owners—specifically what pollutant loads are draining onto or from the property.

WHAT IS A WATERSHED?

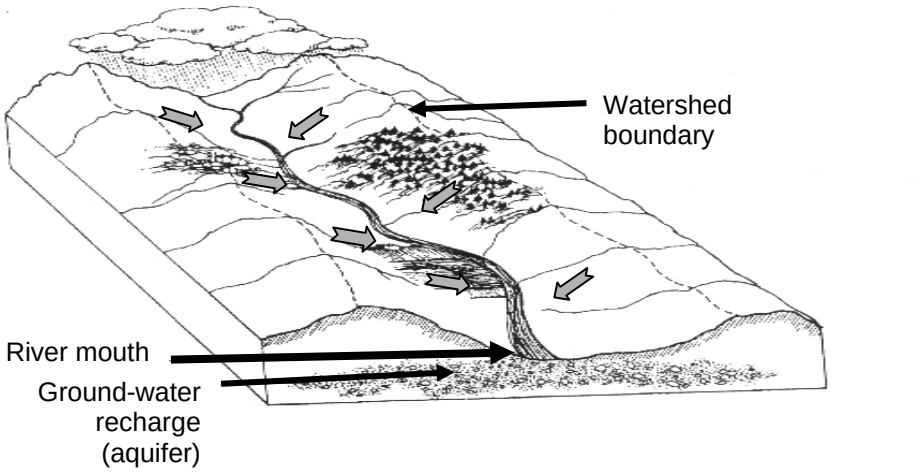
What is a watershed?

A watershed is the area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake, or ground water.

Watersheds can be any size, from a few acres to hundreds of square miles.

A watershed is defined by EPA as an area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake, or ground water (Figure 1-1). A watershed can be very large (e.g., draining thousands of square miles to a major river, lake, or the ocean) or very small, such as a 20-acre watershed that drains to a pond. In the Protocol, we focus more on the smaller watersheds, usually containing only one major stream or waterbody. It is at the waterbody level that states identify whether a watershed is impaired and assess TMDLs. A small watershed that nests inside of a larger watershed is sometimes referred to as a *subwatershed*. In this document we refer to the term *waterbodies* as those waters that drain to a watershed or piece of property.

Figure 1-1. Example of a Watershed



Who should use this Protocol?

This Protocol is written for DoD installations that drain to, or have the potential to affect, state-designated impaired waterbodies.

Managing a property on a watershed basis can yield the greatest return on investment. Considering that most DoD installation activities (e.g., training operations or air emissions) have the potential to impact water quality in some way, investing resources in a comprehensive approach to managing water resources can produce multiple environmental benefits over time. Developing watershed action plans and associated project sheets can assist managers in better planning for future mission and environmental requirements.

WHO SHOULD USE THE PROTOCOL

This Protocol is written for DoD installations that drain to, or have the potential to affect, state-designated impaired (those waterbodies not meeting water quality standards) waterbodies. The Protocol is a guide to assist you in complying with TMDL and drinking water requirements. The Quick Screen Analysis in Table 1-1 contains a series of questions to determine if a watershed assessment should be

conducted at a DoD property. DoD installations that discharge to state-designated impaired waterbodies and/or watersheds should use this Protocol to assist them in complying with TMDL requirements issued for a permit or plan.

Table 1-1. Quick Screening Checklist to Determine if Your Installation Should Conduct Watershed Impact Assessment

Installation screening question	Yes	No
1. Does your installation have surface or ground-water resources such as streams, rivers, lakes, or wetlands, and/or does your installation have drinking water wells/aquifers located on or surrounding installation property?		
2. Does your installation have (if even *one* answer below applies, answer "Yes") • permitted point source discharges, • activities that may contribute to non-point source runoff, or • activities that may impact ground water?		
3. (a) Does the installation drain into a waterbody that is identified on the State CWA 303(d) list of impaired waters; and/or (b) Is your site within an SDWA surface source water or wellhead protection zone or on or near a drinking water source (such as an EPA-listed Sole Source Aquifer) that is used as the primary drinking water source for the installation and/or surrounding communities? Tip: Call your state regulator to get the most accurate water resource information. EPA's "Surf Your Watershed" website at http://cfpub.epa.gov/surf/locate/index.cfm can assist you with finding this information. Also visit your state's water regulatory office website. These sites will enable you to identify your installation's watershed, provide a list of impaired waterbodies within or downstream of the installation, and provide a listing of the source waters protection zones.		
4. Is your property within the Chesapeake Bay Watershed or does it discharge to an estuary covered by the National Estuary Program? Tip: Visit EPA's "Surf Your Watershed" website at http://cfpub.epa.gov/surf/locate/index.cfm. This site will help you identify if your installation is in a protected estuary.		
5. Within the past 2 years, has a regulator cited your installation for noncompliance with a regulatory requirement two or more times and, as a result, required additional water sampling/monitoring at your site (e.g., spills, exceeding of permit standards, runoff)? (a) Was this citation based on *any* legal requirement for discharges to surface water or injection into ground water from any installation mission or military or facility activity? (b) Was this citation for non-implementation of a required management plan or program that protects water resources and human health (e.g., SWPPP, INRMP, SPCC Plan, Pest Management Plan, Drinking Water Sanitary Survey, or Source Water Protection)? Tip: Review your installation violations list for *any* regulatory violation (e.g., RCRA, Clean Water Act, Safe Drinking Water Act, CERCLA, TSCA, Endangered Species Act, FIFRA) related to water quality. EPA's EnviroFacts Database contains a record of enforcement actions for NPDES permits. Review this database at http://www.epa.gov/enviro/html/pcs/pcs_query_java.html.		
6. (a) Has a federal, state, or local enforcement agent; public environmental group; Indian tribe; or other group requested that your installation sample or conduct a study concerning surface or ground-water conditions because of a suspicion of contamination to water resources from installation mission, military operations, facility operations, restoration sites, or other activities? (b) During updates of required management plans (e.g., SWPPP) that protect water resources, fish and wildlife, and/or human health, have you noted a significant area of noncompliance on your installation?		

Note: CERCLA = Comprehensive Environmental Restoration; Compensation and Liability Act; FIFRA = Federal Insecticide, Fungicide, and Rodenticide Act; INRMP = Integrated Natural Resource Management Plan; RCRA = Resource Conservation and Recovery Act; SPCC = Spill Prevention Control and Countermeasures; SWPPP = Storm Water Pollution Prevention Plan; and TSCA = Toxic Substances Control Act of 1976 (15 USC).

DoD installations that do not operate within a state-designated impaired watershed, but have the potential to adversely affect sensitive water resources or drinking water sources downstream from the installation, also can use the Protocol to assist them in developing a site-wide management approach to mitigate point and non-point contaminant sources and manage their water resources. DoD personnel can share the Protocol with partners, such as on-site tenants, or an off-site municipality.

Watershed assessments are conducted for a variety of reasons and at various levels of detail. The watershed assessment process begins with public works and environmental staff and other appropriate installation planning personnel answering the questions. The results will help you determine if a first-level assessment, called a "Watershed Impact Assessment," is necessary at your installation. (*Note*: If you are a Base Realignment and Closure [BRAC] site that no longer has a mission, or military or facility operations, or activities such as those listed below, then you should consult with your Major Command and Regional Installation Management Agency [IMA] to determine whether a watershed analysis or watershed assessment should be conducted.) The DoD installation manager should consult with the environmental coordinator and the facility engineer, or equivalent, when completing the Quick Screen checklist.

If you answer:

- NO to Question 1—you do not need to conduct an assessment.
- YES to Questions 1 and 2 *and* to any other questions—you should conduct a site watershed impact assessment. Continue onto Chapter 2 for further instructions.
- YES to Questions 1 and 2 and NO to the other questions—you do not have to conduct an assessment at this time. However, you should note in your environmental management system program activities that are associated with water resource issues, and reevaluate the installation's status when new 303d lists are developed and approved by the states and EPA, or when water quality regulations change. (*Note*: The 303d lists currently are updated every 2 years.)
- YES to Question 1, but NO to all other questions—you do not have to conduct a watershed assessment at this time. Note the responses for your environmental records and reevaluate your installation's status every 2 years or when new mission activities are assigned to your installation. (This is important due to changes in federal, state, and local regulations.)

How do I know whether to conduct a watershed assessment?

Complete the Quick Screening Analysis to determine if your installation should conduct a watershed impact assessment.

WATERSHED IMPACT ASSESSMENT PROCESS

The Protocol consists of six parts to assist installations in conducting their own watershed impact assessment and developing a corresponding watershed impact assessment plan. You will complete four electronic forms during the process, which are located in Appendix A. The electronic forms will calculate the majority of the calculations automatically. Figure 1-2 provides an overview of the Protocol's six major steps, which are as follows:

Electronic forms

You will complete four electronic forms, which are located in Appendix A. Most of the calculations will be automatically inputted for you.

- *Step 1. Determine if your installation should conduct an assessment.* Answer the six questions in the Quick Screening Analysis (Table 1-1) to determine if your installation should use this Protocol.

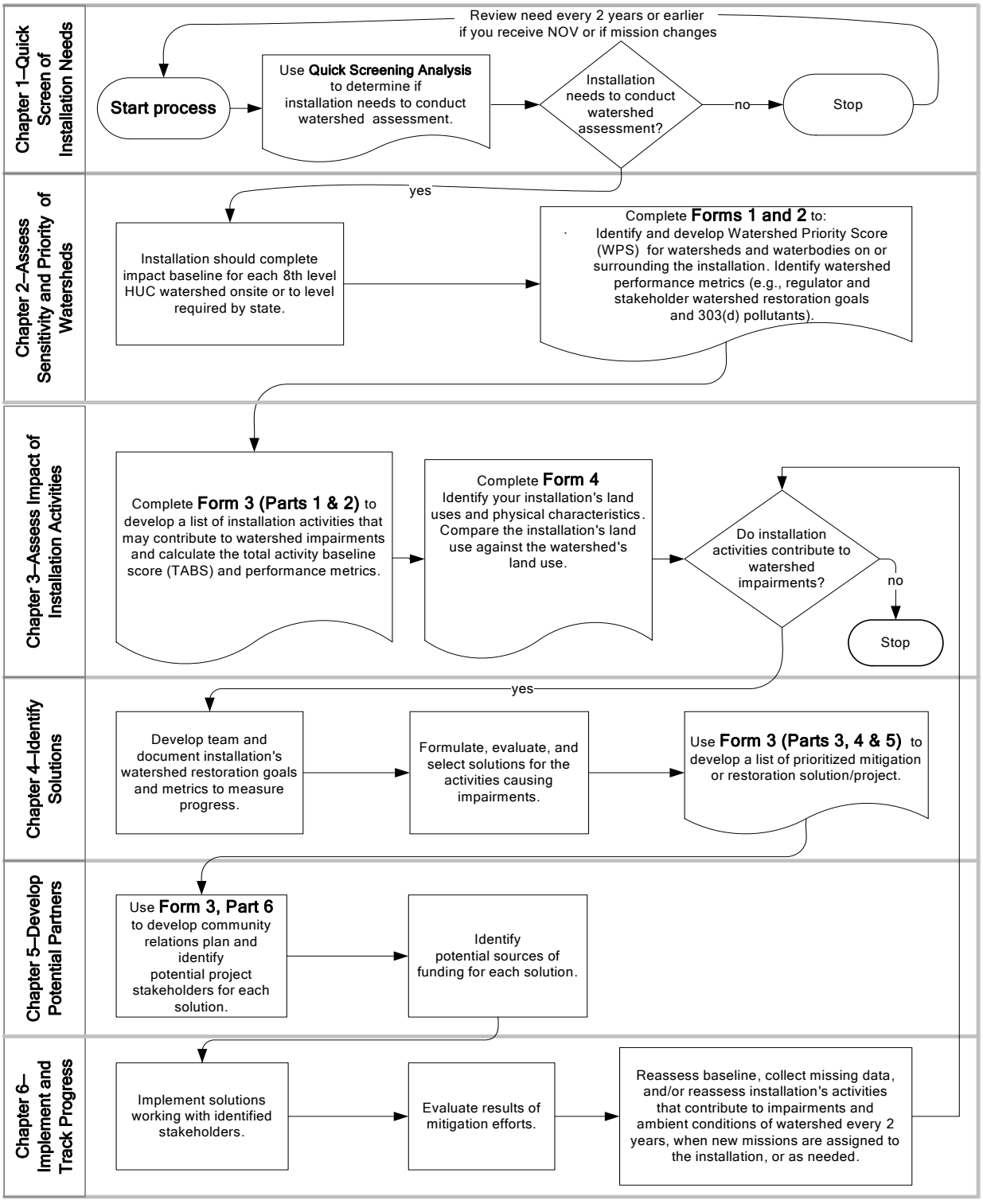
- *Step 2. Identify each watershed on your installation and calculate the watershed priority score (WPS) for each using Forms 1 and 2*. Assess the condition and vulnerability of watersheds, subwatersheds, and waterbodies; determine designated uses; and identify impairments of concern. Complete Forms 1 and 2 to identify and prioritize the watersheds, subwatersheds, and waterbodies located on or along the installation boundary. The Protocol walks you through the process of documenting the designated uses and impairments of concern. At the end of this step, you will have developed a WPS for each significant waterbody on or surrounding your installation based on the current conditions, future vulnerability, and compliance requirements of that waterbody.

- *Step 3. Calculate the total activity burden score (TABS) for each significant installation asset or activity using Form 3 (Parts 1 and 2) and Form 4.* Assess the potential impact of installation activities. Once Form 3 is completed, you will be able to sort activities highest to lowest for each watershed. This list can be used to determine specific activities requiring further analysis. Once the watershed assessment is complete, you can use Form 3 to track improvements made within each watershed. This part of the process is divided into three sections:

    1. Using the list of typical installation activities found in Appendix A; identify those activities occurring on your installation that may contribute to the impairments of concern. On Form 3, Part 1, you will develop your list of installation activities, establish a baseline of installation activities by land use, and provide other general information related to each activity.

    2. Using Form 3, Part 2; assess the potential impact of installation activities by calculating an impact score and TABS for each activity. The TABS is a sum of the activity impact score and the WPS.

Figure 1-2. Overview of the DoD Installation Watershed Impact Assessment Protocol Process



3. Using Form 4, create a baseline of current installation land uses to determine impacts to the watershed, identify impervious surface reduction goals, and improve planning projects to reduce runoff of pollutants. Determine the total percent pervious and impervious surfaces based on each activity's pervious and impervious surfaces. Use the results to compare your installation's land uses and total activities' pervious and impervious surfaces with that of the watershed. Compare watershed and stormwater management reduction goals in impervious surfaces with installation goals. Use Form 4 to summarize the installation's land-use characteristics and determine installation activities' impact to the watershed due to impervious surfaces and pollutant runoff. Adjust installation and activity watershed goals and objectives as necessary to meet watershed goals and environmental management system/sustainability goals as determined by land use. After comparing installation impervious totals to watershed reduction goals for impervious surfaces, determine goals for reduction for each activity.

- *Step 4. Identify cost-effective solutions for each significant activity to mitigate high-priority impacts using Form 3, Parts 3, 4, and 5.* Identify whether the installation needs additional projects to mitigate high-priority activities or land-use conditions. Compare the prioritized list of activities and their associated impairments with available best management practices (BMPs). The Protocol contains references to sources of cost-effective BMPs and innovative projects that can help you mitigate an activity's potential impact on the watershed. Compare improvement in condition, value, and project costs to select the most cost-effective projects. Develop a project description, justification, and cost. Track funding requests and the project through completion.

- *Step 5. Identify partnerships and funding sources using Form 3, Part 6.* Identify and develop partnerships with other stakeholders to implement the selected BMPs and other watershed restoration efforts that reduce the installation's impact on the watershed. Form 3, Part 6, allows you to list partners, agreements, benefits, addresses, and points of contact for tracking purposes. This guide provides links to groups active in watersheds around the country as well as types of groups that may provide assistance and support. Chapter 5 contains a partnership template for tracking regional and project partners.

- *Step 6. Implement solutions, track progress, and update the plan.* Implement the identified solutions, track their progress, and update the plan and project requests as required to adjust mission direction as new information becomes available.

Note

Inputting results of a GIS can facilitate the watershed process. Regardless of the installation size or the amount of data available, it is important that you focus data collection efforts on high-priority waterbodies and high-priority activities.

The majority of the information needed to complete the Protocol process should be readily available from existing installation records and federal or state regulatory agencies. EPA has created Watershed Assessment, Tracking & Environmental Results (WATERS), a database and interactive map site containing a wealth of information about the nation's watersheds, which is located at http://www.epa.gov/waters/enviromapper/index.html. WATERS is a tool that unites water quality information previously available only on individual state agency home pages and at several EPA websites. It is a Web-based geographic information system (GIS) that shows watershed delineations, waterbodies, permitted discharges to all media, TMDL status, and water quality standards. You can quickly identify the status of individual waterbodies and generate summary reports on all waters that influence your installation.

Successful watershed assessments require a synthesis of a wide variety of complex environmental information. Inputting your results into a GIS can facilitate analysis and record keeping. Many installations already have a GIS in place that can be supplemented with the watershed impact assessment results.

Level of Effort Required to Conduct an Assessment

The overall level of effort required to conduct an assessment depends on how much work the installation has already conducted in the water resource area. Large installations that have an extensive amount of information relating to on-post activities should easily collect data with relatively no effort. Available information may include engineering studies, operational and monitoring records for a variety of activities, and regulatory data and reports. Smaller installations with fewer resources may not have this information readily available. Regardless of the installation size or amount of data available, there is often little money and time available to conduct additional planning efforts. Therefore, to be more effective, you should focus on conducting this assessment as resources become available and prioritize your efforts on the following:

- Portions of the installation that drain to impaired or sensitive waterbodies and/or subwatersheds. Divide the entire installation watershed (8th hydrological unit codes [HUCs]) into subwatersheds (10th through 16th HUC), and then evaluate each subwatershed as a stand-alone area. Start with the 8th HUC level waterbody or subwatershed that has the highest WPS.

- High-priority activities or those installation activities that have the greatest potential to contribute to the TMDL-listed waterbody impairments.

OTHER WATERSHED ASSESSMENT PROCESSES

Other available watershed assessment processes include the following:

- *Watershed Protection Audit* establishes a baseline of current strategies and practices within a watershed. The audit can be used to determine the watershed protection tools currently available in a watershed. The audit is located at http://www.cwp.org/CommunityWatersheds/WatershedProtectionAudit2.pdf.

- *Watershed Vulnerability Analysis* provides guidance on delineating subwatersheds, estimating current and future impervious cover, and identifying factors that would alter the initial classification of individual subwatersheds. This guidance outlines a basic eight-step process for creating a rapid watershed plan for either a large watershed or a jurisdiction. The Watershed Vulnerability Analysis is located at http://www.cwp.org/VulnerabilityAnalysis.pdf.

- *Retrofit Assessment* includes the Eight Steps to Stormwater Retrofitting, which outlines the eight steps of performing a retrofit inventory. This involves examining existing stormwater management practices and pinpointing locations that might benefit from additional practices. Details on retrofit implementation are included. The Retrofit Assessment is located at http://www.cwp.org/retrofit_article.htm.

SECURITY ISSUES

Important security consideration!

Obtain approval from the legal and/or public affairs offices before releasing any information about the location or nature of site activities to the public.

Be aware of security issues when releasing information to the public. It is recommended that you consult with the installation's legal and public affairs offices before releasing any information about the location or nature of site activities to the public.

Chapter 2
Identify Your Watershed and Assess Its Current Condition and Vulnerability

INTRODUCTION

In this chapter, you learn to identify your installation's watersheds and determine their current conditions by completing Form 1, Summary of the Installation's Receiving Watersheds and Associated Waterbodies, and Form 2, Watershed Priority Score: A Sensitivity Scoring and Data Collection Form for Waterbodies/Watersheds. Forms 1 and 2 enable you to create a summary of key watershed information, including the name of the watershed(s), the HUC(s), the significant installation waterbodies, and their condition and vulnerability scores. This chapter also presents an approach for developing goals and selecting key performance metrics to measure progress. The chapter and Forms 1 and 2 help you to

Already have watershed information?

You may have already identified the watersheds and waterbodies to which the installation drains. If so, ensure that you have all of the information in Form 1 and that you have *quantitatively scored their condition.*

- identify watershed names and HUCs;
- create a map of the watersheds and their boundaries;
- prepare a list of regulatory and local designated uses, impairments of concern, and an overall watershed condition score using available information;
- calculate a WPS and summary information, which will assist you to prioritize activities for further analysis and determine activity impacts to water resources within the impaired watershed;
- identify key stakeholders active in the watershed; and
- identify key goals and performance metrics to guide the prioritization of projects and enable the tracking of progress over time.

Complete Forms 1 and 2 by relying on existing information and tools primarily available at the installation and from EPA and state and local regulators. In addition to using the sources of information prescribed by the Protocol, other methods, such as those provided below, are available for determining the conditions of the installation's watershed:

- *Environmental office documentation and GIS data.* The environmental office may have already identified the watersheds and waterbodies to which

the installation drains and their conditions, including information in GIS format.

- *Watershed Vulnerability Analysis.* This analysis provides guidance on delineating subwatersheds, estimating current and future impervious cover, and identifying factors that would alter the initial classification of individual subwatersheds. The document outlines a basic eight-step process for creating a rapid watershed plan for either a large watershed or jurisdiction. It is available at http://www.cwp.org/Vulnerability_Analysis.pdf.

- *Watershed Protection Audit.* This audit establishes a baseline of current strategies and practices within the watershed. By understanding the current state of development, watershed groups can assess strategies, practices, strengths, and weaknesses and can better plan future efforts. This document can help watershed organizations to audit the watershed protection tools currently available in their watershed. It is available at http://www.cwp.org/Community_Watersheds/Watershed_Protection_Audit2.pdf.

FORM 1: IDENTIFY THE WATERSHED NAME AND HYDROLOGICAL UNIT CODE

Form 1 is a summary table for easy referencing. You will use the form to identify your installation's water resources, their corresponding HUCs that regulators use to manage them, their overall condition, and impairments.

If you already have the watershed background information, you have already begun the first step of the watershed assessment process. You need to ensure that you have all of the information in Form 1 and that you have quantitatively scored the condition of your installation's receiving waterbodies.

Form 1: Identify Installation's Watersheds and Key Characteristics

Locate your watershed

Locate your installation and its watershed using the locator function on EPA's "Surf Your Watershed" website at http://cfpub.epa.gov/surf/locate/index.cfm, or contact your state water permitting program.

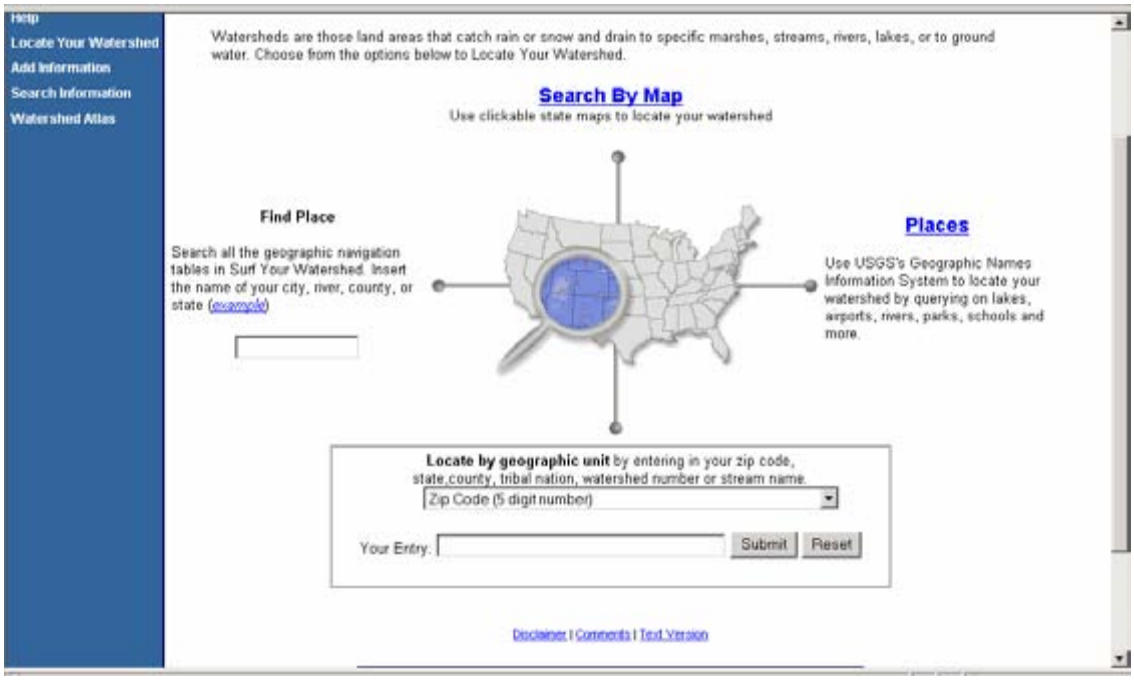
Use the following instructions to complete Form 1:

- *Questions 1–3.* Enter the installation's name, state, and ZIP code.

- *Questions 4–5.* Identify your installation's watersheds. If you do not already have this information, go to EPA's "Surf Your Watershed" locator website at http://cfpub.epa.gov/surf/locate/index.cfm, as shown in Figure 2-1. Enter the installation ZIP code into the "Locate by geographic unit" box. This will provide the "Watershed Profile" (at the 8th-level HUC) for your installation. You also may use the "Search By Map" function at the top of the screen to locate the installation. If using the mapping function, select your state and drill down to your general location until the

"Watershed Profile" page is returned. Enter the watershed name and 8th HUC into Questions 4 and 5.

Figure 2-1. Example of EPA "Surf Your Watershed" Locator



A HUC is a numbering system developed by the U.S. Geological Survey (USGS) that uniquely identifies all watersheds in the United States. The HUC is commonly called a "watershed address." The HUC can range from 2 to 16 digits long—the higher the number, the smaller the watershed. Table 2-1 provides an example of the 2nd to 12th HUC numbering format.

A HUC is a watershed's address

The watershed's HUC is commonly called its "watershed address." The USGS provides access to watershed GIS boundary files on its website, at http://water.usgs.gov/GIS/huc.html.

Table 2-1. Example of Watershed Addresses Using HUCs

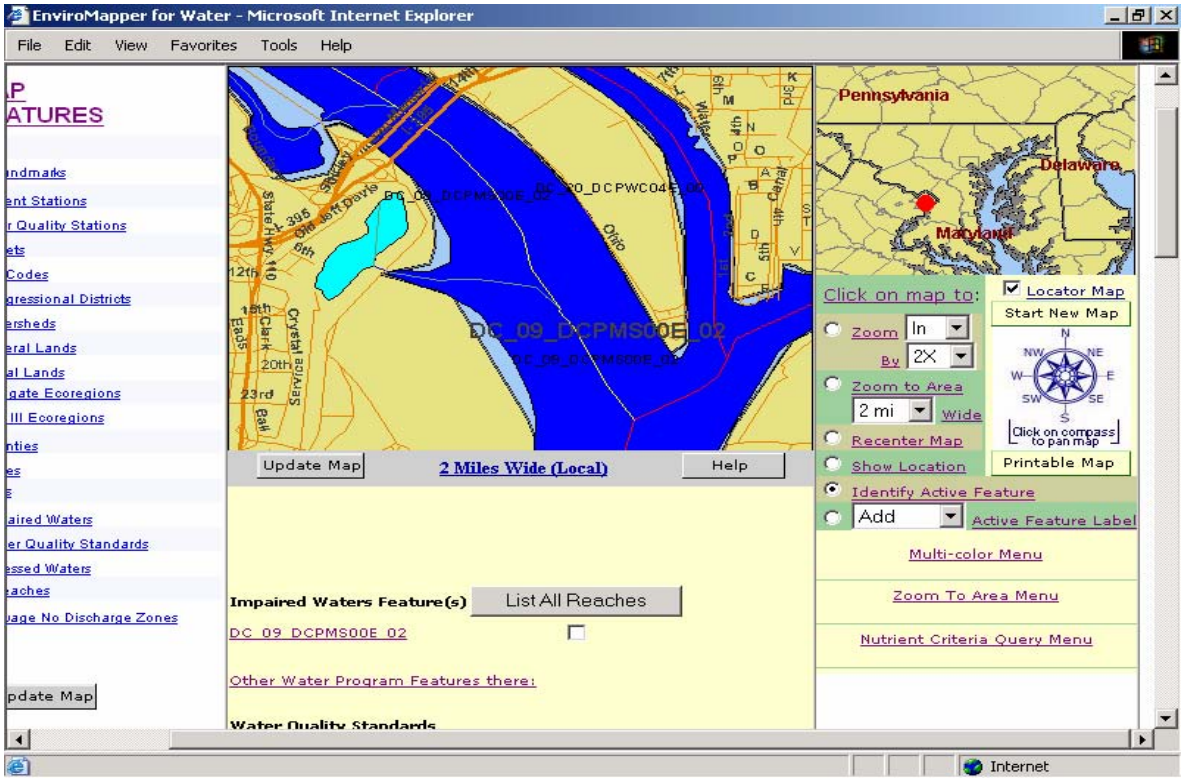
Description	Proper name	HUC address	# digits
Region	Ohio River	05	2
Subregion	Wabash and White Rivers	0512	4
Basin	Wabash River	051201	6
Sub-basin	Vermilion River	05120109	8
Watershed	North Fork Vermilion	0512010909	10
Subwatershed	Lake Vermilion	051201090905	12

- *Question 6.* Copy the listed waterbodies, HUCs, and parameters of concern to the appropriate column under Question 6. The priority score, or WPS, is determined in Form 2. To obtain the 303(d)-listed waterbodies, use one of the following sources:

  - *State Water Management Agency.* Call the installation's state water management agency or visit its website, which usually includes the latest 303(d) report. The 303(d) report lists the impaired waterbodies. If your waterbody is not listed, it is not impaired.

  - *WATERS website.* Use the WATERS website at http://www.epa.gov/waters/enviromapper/index.html. Select the area on which you would like information, such as by ZIP code, and enter the appropriate information. Then click on the "Zoom to Selected Area" button. A map of that area will appear. Select the "Update Map" button. A map of the impaired waterbodies in that area will appear. Select "Identify Active Feature" and click on the "Update Map" button. Information on the impaired waterbodies appears below the map (Figure 2-2). You may need to use the zooming tools to identify the impaired waterbodies.

Figure 2-2. Example of EPA WATERS Map



➤ *EPA TMDL website.* Use the TMDL website at http://www.epa.gov/owow/tmdl (Figure 2-3). Click on your state, then the waters listed by watersheds, and then your watershed. This will return a list of the 303(d)-listed waterbodies in the watershed. Click on your waterbody. For each listed waterbody, the website provides the following information: name, parameters (pollutants) of concern, priority for TMDL development, and potential sources of impairment.

Figure 2-3. Example of EPA TMDL Website

◆ *Question 7.* Identify and list the installation waterbodies not listed as impaired, but located on your installation and may become a priority for your installation. This is important because states update water quality information every 2 to 4 years on all waters in the state, and all installation waterbody information will have to be reevaluated on a regular basis.

Form 1. Summary of the Installation's Receiving Watersheds and Associated Waterbodies

Instructions: Complete this form for each 8-digit HUC watershed using information from Form 2. Please attach a watershed map to all Form 1s. Transfer watershed information, WPS, goals, and comments to Form 3, Part 1.

1. Installation name	2. State and county	3. ZIP code(s)

4. Name of 8-digit HUC watershed(s)	5. 8-digit HUC(s)

6. List of the receiving watersheds or waterbodies *listed as impaired* by federal or state regulators that cross or are within the perimeter of the installation

Name of waterbody	HUC, 8- to 16-digit, or state identifier	List of impaired designated uses	Summary of impairments of concern (from Form 2)	WPS (from Form 2)

7. List other significant waterbodies associated with the installation that *are not listed as impaired* by federal or state regulators

Name of waterbody	HUC, 8- to 16-digit, or state identifier	List of designated uses	Summary of impairments of concern (from Form 2)	WPS (from Form 2)

Form 2: Calculate the Watershed Priority Score for Each Waterbody Listed on Form 1

Form 2 basics

Complete Form 2 for each significant waterbody and use the results to select key performance metrics to serve as the baseline for measuring your installation's progress. You will need to complete a separate Form 2 for each waterbody you identified in Form 1.

Complete Form 2 for each significant waterbody and use the results to select key performance metrics to serve as the baseline for measuring your installation's progress. You will need to complete a separate Form 2 for each waterbody listed on Form 1. If you use the electronic forms found in Appendix A, the information from Form 2 will automatically be transferred and inputted into Form 1.

Use the information provided by EPA on its "Surf Your Watershed" website to assess the WPS. The WPS is the sum of the watershed indicator condition and vulnerability scores, plus points applied to the TMDL and compliance-based questions found in Form 2. Calculating a WPS enables you to prioritize the sensitivity of your waterbodies and, thus, the activities that occur in their drainage basin. The higher the WPS, the more sensitive the watershed is to installation activities.

Use the following instructions to complete Form 2:

1. Enter the name and HUC code for the waterbody listed in Question 6 or 7 of Form 1.

Form 2 online information sources

Most of the information needed to complete Form 2 is available from existing installation records or online at

- **EPA's "Surf Your Watershed" website at http://cfpub.epa.gov/surf/locate/map2.cfm, and**
- **EPA's "Index of Watershed Indicators Database" at http://www.epa.gov/iwi/.**

2. For the waterbody listed in Question 1, answer Questions a through i, which determine the designated uses of the waterbody and whether it meets them. Go to the state regulator or EPA's state 305(b) reports to determine the waterbody's designated uses. The designated uses are from EPA's national use support categories, *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports and Electronic Updates)*. Your state may have state-specific subcategories, which you can enter in Question 2i. For each designated use, check the degree to which it meets the use, the impairments, and the causes or stressors of them. For example, if the waterbody does not fully support the water-use classification of fishing, and non-point source pollution from urban runoff is the cause of the impairment, check "partially supporting" for 2b and enter non-point source pollution as the impairment and urban runoff as the cause. Sum all of the points for the answers to 2a–i and enter the "Total Impairment Score." If you do not know the answer for the specific waterbody, enter the default value for the corresponding 8-digit HUC.

3. Identify impairments and TMDLs.

    a. Transfer the state 303(d)-listed pollutants of concern (impairment) from Form 1, Questions 2 to 3a. Note whether the state has developed, or is developing, a TMDL for the waterbody. EPA and the states provide this information for most waterbodies on EPA's TMDL tracking website at http://www.epa.gov/waters/tmdl/ and the 303(d) list. It is

best to call the state office for the most accurate information. Note the TMDL's "effective date" or "potential date" if it will go into effect later.

b. Calculate the "Total TMDL Score" by adding the points from 3a. Enter the total in 3b.

4. For the waterbody listed in Question 1, answer "yes" or "no" to Questions a through d to determine the waterbody's vulnerability. Sum all of the points for the answers to 4a–d and enter the "Total Vulnerability Score" into 4e.

   a. Is the percentage of impervious surfaces above 25 percent of the watershed land area for either current or projected land use? This information can be obtained by contacting your state water program point of contact or the watershed's 305(b) report.

   b. Is the projected population growth rate of the watershed above 7 percent? This information can be obtained by contacting your state water program point of contact or the watershed's 305(b) report.

   c. Does the waterbody contain impounded waters such as dams or fish barriers? This information can be obtained by contacting your state water program point of contact or the watershed's 305(b) report.

   d. Is receiving water listed as a protected estuary? This information can be obtained from EPA's National Estuary Program website at http://www.epa.gov/owow/estuaries/find.htm.

   e. Add points from answering Questions 4a–d. Place the sum in box 4e.

5. Has EPA, DoD, or an individual service, state, installation, water authority, or local group listed restoration goals for the watershed or waterbody? If so, list the specific waterbody or watershed restoration goals associated with each category. These goals can serve as potential installation watershed restoration performance metrics. Local watershed information can be found on EPA's "Surf Your Watershed" website under the "Environmental Websites" link.

6. Has a federal, state, or local enforcement official requested that the installation or municipality monitor/sample the watershed or waterbody? Contact your state water program point of contact.

7. Have water withdrawal/use restrictions been imposed by a regulator for this waterbody? Contact your state drinking water point of contact.

8. Have potential impacts to human health been identified by EPA or the state as a significant concern for the waterbody (e.g., air deposition of a pollutant such as mercury to the waterbody, or pollutants in the water causing a risk to drinking water)? Contact your fish and wildlife point of contact.

9. Is this watershed or waterbody designated as a special water resource under the American Heritage River Program, Great Lakes Program, Scenic Waters Program, or other special program established to protect the water resource? Refer to EPA's "Surf Your Watershed" website, located at http://www.epa.gov/surf/index.html for more information.

10. Are there specific stressors or concerns at your installation such as the inability to meet mission due to lack of water, endangered species protection, or encroachment to training lands? Work with your installation's training command to identify specific sustainability problems. List each stressor. Useful tools include the Army Corps of Engineer's Sustainability, Encroachment, and Room to Maneuver program, which is developing new tools and approaches to help maintain the traditional and future operations planned for installations. See http://www.cecer.army.mil/KD/SERM/index.cfm?chn_id=1063 and https://bc.cecer.army.mil/ff/sirra.do.

11. Calculate the total additional watershed stressors score by summing the points from Questions 5–10. Enter this total in Question 11.

12. Calculate the total WPS for the waterbody by adding the total impairment score (Question 2), the total TMDL score (Question 3), the vulnerability score (Question 4), and the additional watershed stressors score (Question 11).

Transferring answers from Form 2 to Form 1

Remember to complete a separate Form 2 for each waterbody listed in Questions 6 and 7 of Form 1. After completing each Form 2, remember to transfer the watershed information and the WPS onto Form 1, Questions 6 and 7.

Remember to complete a separate Form 2 for each waterbody listed in Questions 6 and 7 of Form 1. After completing each Form 2, remember to transfer the watershed information and the WPS onto Form 1, Questions 6 and 7.

Form 2. Watershed Priority Score: A Sensitivity Scoring and Data Collection Form for Waterbodies/Watersheds

Complete a Form 2 for each waterbody listed in Form 1, Questions 6 and 7. Record the WPS and waterbody pollutants of concern onto Form 1 for each waterbody.

1. Name of the watershed and corresponding 8- to 16-digit HUC code (or state identifier):

2. Waterbody/watershed impairment score for the watershed listed in Question 1. Go to the state regulator or EPA's state 305(b) reports to determine the waterbody's designated uses and if they are being met. The designated uses are from EPA's national use support categories. Your state may have subcategories, which you can enter in Question 2i. **For each designated use, check the degree it meets the use, the impairment(s), and the causes/stressors of them. Then sum all of the points for the answers to 2a–i and enter in the "Total Impairment Score."**

Total Impairment Score =

Designated use	Impairment	Cause/stressor	Not supporting 3 pts	Partially supporting 2 pts	Fully supporting 1 pt	Not a designated use 0 pts
a. Aquatic life use						
b. Fish consumption use						
c. Shellfishing use						
d. Swimming use						
e. Secondary contact use						
f. Drinking water use						
g. Agriculture use						
h. Cultural/ceremonial use						
i. State/municipal specific use _____						

3. Identify impairments and TMDLs:

a. Transfer the state 303(d)-listed pollutants of concern (impairments) from Form 1, Question 2, and note if the state has developed a TMDL and its effective or potential date. Then sum all of the points for the answers to 3a and enter in the "Total TMDL Score."

	TMDL status?			
	In place 2 pts	Being developed 1 pt	Not in place 0 pts	Enter TMDL date and an "E" or "P" for effective or potential date
303(d) Impairment 1:				
303(d) Impairment 2:				
303(d) Impairment 3:				
303(d) Impairment 4:				
303(d) Impairment 5:				
303(d) Impairment 6:				

b. **TMDL Total Score =**

4. Waterbody/watershed vulnerability score for the watershed listed in Question 1. Go to the state regulator or EPA's "Surf Your Watershed" state 305(b) reports to determine the waterbody's designated uses and if they are being met. Then sum all of the points for the answers to 4a–d and enter in the "Total Vulnerability Score."

Total Vulnerability Score =

	Yes 1 pt	No 0 pts
a. Are the impervious surfaces above 25% of watershed land area (for either current or projected land use)?		
b. Is the population growth rate of the watershed above 7%?		
c. Does the waterbody contain impounded water (e.g., dams and fish barriers)?		
d. Is the receiving water listed as a protected estuary?		

Form 2. Watershed Priority Score: A Sensitivity Scoring and Data Collection Form for Waterbodies/Watersheds (continued)

Complete a Form 2 for each waterbody listed in Form 1, Questions 6 and 7. Record the WPS, waterbody pollutants of concern, goals, and comments onto Form 1 for each waterbody.

	Yes 1 pt	No 0 pts	Goals and comments
5. EPA, DoD individual service, state, water authority, or local group listed restoration goals for the waterbody in Question 1? If so, list the specific goals.			
Biodiversity and habitat loss			
Riparian buffer strip loss			
Imperviousness/uncontrolled storm-water runoff			
Invasive species			
Wetlands			
Other:			
6. Has an enforcement official requested the municipality to monitor/sample the watershed or waterbody?			
7. Have water withdrawal/use restrictions been imposed by a regulator for the waterbody?			
8. Have potential impacts to human health been identified by EPA or the state as a significant concern for the waterbody (e.g., air deposition of a pollutant such as mercury to the waterbody, or pollutants in the water causing a risk to drinking water)?			
9. Is this watershed or waterbody designated as a special water resource under the American Heritage River Program, Great Lakes Program, Scenic Waters Program, or other special program established to protect the water resource?			
10. Are there specific stressors or concerns at your installation such as the inability to meet mission due to lack of water, endangered species protection, or encroachment to training lands? List each stressor. a. Stressor: b. Stressor: c. Stressor:			
11. Calculate the total score for watershed restoration goals, issues, and stressors by summing the points from Questions 5 through 10. **Additional Watershed Stressors Total:**			
12. **Watershed Priority Score =** impairment score (Question 2) + TMDLs score (Question 3) + vulnerability score (Question 4) + additional watershed stressors score (Question 11)			

CREATE A WATERSHED MAP

To continue the assessment process, you need to create a map of the installation in relation to the watershed and waterbodies. Creating a map that models hydrologic conditions and land use can identify watershed areas with the greatest potential impact on source water quality. The size of the watershed you are looking at should be appropriate for the size of your installation.

Aerial and topographic maps available online

The following websites contain various digital and topographic maps that can assist with watershed efforts:

- **USGS provides digital, topographic, and HUC maps.**
- **EPA WATERS is an Internet-based GIS mapping tool linked to TMDLs and water quality standards.**
- **Montana State University maintains an extensive online collection of HUC maps backed up with digital maps.**

Many DoD installations have in-house GIS capabilities. Most installations maintain a GIS map for the installation that contains various data layers that will be helpful in creating the watershed map. Contact your installation Directorate of Public Works (DPW), Real Property Section, or installation engineer for a current map of the installation. (Since DPW, the Real Property Section, the installation engineer, and the master planner will play a part in both the assessment and, later, the development of protection strategies; their involvement in all phases should be sought. They will be a critical element in making the overall program sustainable and achieving the overall objective of incorporating watershed protection into land use and operational practices.) A GIS is an effective way to develop a map of the installation, determine land use, identify the percentage of pervious versus impervious surfaces, and identify environmentally sensitive areas. It presents selected data layers from the watershed assessment process into an easily interpreted format. You should create a map that shows the following data layers:

- 8th-level watershed and subwatershed boundaries.
- Installation boundaries.
- Topography.
- All major National Pollutant Discharge Elimination System (NPDES) discharge points.
- Vegetative cover.
- Land-use type. With assistance from the master planner, the land-use type and the general percentage on the installation can be determined by analyzing aerial photos. This information can be useful when determining stormwater reduction goals for impervious surfaces. Many regulators give credits and a reduction in permit requirements for implementing BMPs that reduce impervious surfaces and stormwater runoff. The U.S. Green Building Council has developed the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, a national standard for developing high-performance, sustainable buildings. Projects can earn LEED certification for sustainability based on the number of sustainable practices incorporated into the project. DoD facilities that implement low-impact development techniques can receive LEED points for limiting the disruption of natural water flows by minimizing stormwater runoff, increasing on-site infiltration, and reducing contaminants. Currently, Navy and Air Force policies encourage the use of the LEED checklist, which the Army soon plans to adopt as well. Other DoD criteria such as the Army's Sustainable Project Rating Tool, which is adapted from the LEED checklist, also may apply.
- Waterbodies and points flowing on- and off-site.
- Major structures, utility lines, and roads.

Because many installations may not have watershed boundaries delineated for their site, it may be necessary to create this layer. Delineating watersheds is generally straightforward. However, it may or may not be the easiest step depending on the type and number of subwatersheds involved on the installation. The delineation involves identifying the drainage area above installation boundaries on a topographic map. In some cases, the total watershed area may be very large, thus prohibiting the investigation of all contributions from pollutant sources over such a wide area. The watershed drainage area must still be defined in order to identify the total area contributing to the water quality in the watersheds affected by the installation, and to eventually consider all potential contributors to any identified impairment. As assessments are completed for other water systems upstream, their information will be available for review and incorporation into your assessment and protection plan. The U.S. Army Environmental Center and USGS provide detailed guidance and hard-copy maps on delineating surface watersheds on their "User's Guide for Source Water Assessment and Protection at U.S. Army Installations" website at http://water.usgs.gov/usaec/tools.html.

A number of federal, state, and local government agencies may already have topographic data in digital form, including the delineation of various watersheds and aquifer boundaries. These sources should be contacted first to reduce duplicate effort. State or regional geologic agencies should be the first source you contact. They will have a greater knowledge of the hydrologic and hydrogeologic conditions of the area, and they most likely will have studied the conditions in great detail. State agencies also will know what information is available in digital or other format such as reports and studies. A listing of state agencies is available at http://www.epa.gov/OGWDW/source/contacts.html.

In addition, digital and topographic maps of the 8th HUCs are available from the following sources:

- Web-based watershed mapping tools:
  - EPA's WATERS site at http://www.epa.gov/waters/.
  - The Montana State University website at http://www.esg.montana.edu/gl/huc/index.html.
- Digital USGS topographic maps:
  - USGS topographic maps and aerial photos site at http://geography.usgs.gov/partners/viewonline.html.
  - USGS watershed GIS boundary files at http://water.usgs.gov/GIS/huc.html.

SELECT INSTALLATION GOALS AND PERFORMANCE METRICS

Having systems in place to measure and communicate progress is a critical part of watershed work. Therefore, the Protocol includes a space on Form 2 to identify measures of progress (often referred to as "performance metrics") for a specific watershed. Appropriate measures not only keep watershed issues on installation management's "radar screens," but, as they are met, the measures allow you to share successes and highlight new challenges to the watershed. The important thing is to make sure that the appropriate measures of progress are selected and that information on these measures is shared with relevant stakeholders.

Measurements of progress should be associated with achieving goals set for the installation's watershed effort. (Refer to EPA's "Top Ten Watershed Lessons Learned" at http://www.epa.gov/owow/lessons/.) Depending on the installation's watershed restoration goals, you can choose water quality measurements (e.g., dissolved oxygen, bacteria levels, and fecal coliform) or less direct water quality-based results (e.g., number of trees planted, number of watershed groups in a state, pounds of trash collected, and number of miles protected from erosion). To make sure that progress does indeed occur, you should identify who is specifically responsible for measuring and achieving each goal identified in the plan. This can include establishing agreements that commit groups to certain actions within certain time frames.

For many watersheds around the country, different stakeholders, including regulators, have identified specific restoration goals. For example, the Chesapeake Bay Program has set various goals to improve the Chesapeake Bay watershed. One such goal is to have "a Chesapeake Bay free of toxics by reducing or eliminating the input of chemical contaminants from all controllable sources to levels that result in no toxic or bioaccumulative impact on living resources that inhabit the Bay or on human health." The Puget Sound Water Quality Action Team has set a variety of goals including reducing non-point source pollution and reducing nuisance species. Most of these goals are voluntary, but there is a trend for them to become mandatory. For example, the Estuaries and Clean Waters Act of 2000 requires federal agencies in the Chesapeake Bay Watershed to comply with previously voluntary Chesapeake Bay agreements. Thus, you should clarify their goals so that they focus the installation's actions on the impacts they will have on the watershed, the resources they will control, and the specific property within installation boundaries.

Chapter 3
Assess Potential Impact of Installation Activities and Physical Characteristics

The next step in the watershed impact assessment process is to identify and assess the potential impact of the installation's activities and physical characteristics (e.g., land uses, soil types, and structures) on the watershed. This chapter provides instructions for completing Forms 3 and 4:

- Form 3, Parts 1 and 2. Develop a list of installation activities prioritized by watershed WPS. Determine the installation activity watershed impact score for each priority activity identified on Form 3, Part 1.
- Form 4, Installation Land Use Analysis, Impacts, and Goals.

You should find most, if not all, of the information to complete these forms in existing sources. When complete, these forms will enable you to do the following:

- Validate a list of activities occurring within each watershed on the installation.
- Create a list of priority installation activities by watershed that do, or have the potential to, contribute to specific watershed impairments (e.g., TMDL targeted pollutants) or are contributing to water quality degradation.
- Create a relative total activity burden score for each activity to assist in quantifying its known or potential impact and regulatory requirements relative to the vulnerability and condition of the watershed(s) as identified by the WPS in Form 1. The TABS is determined for each activity by first calculating an activity impact score (AIS) on Form 3, Part 2. The AIS then is added to the WPS for the specific watershed in which the activity occurs.
- Identify specific installation land-use conditions, physical characteristics, and activities that may contribute to general watershed and waterbody impairments. You also will be able to compare existing site conditions to specific watershed restoration goals, objectives, and projects for activities generated on Form 4.

FORM 3, PART 1: DEVELOP AN INITIAL LIST OF ACTIVITIES

Form 3, Part 1, addresses installation activities that may impact watersheds or that may be affecting the state's TMDL process. The form contains a list of typical activities found on installations. It is important to be consistent with other installation activity lists such as your EMS list of activities, the categories used by the Army EMS guide, and the automated Environmental Performance Assessment System (EPAS) program. This will not only assist in easily identifying mission and operational requirements, but it will help you integrate EMS/EPAS requirements with this Protocol and other management programs used on the installation. In addition, you will be able to identify regulatory requirements, address installation-wide noncompliance in a prudent manner, and develop integrated pollution prevention (P2) program/opportunities information by activity type. The following instructions will help you to complete Part 1 of Form 3, found in Appendix A. If you choose not to use the electronic form, you will have to duplicate and fill in the Form 3 found at the end of the chapter for each activity.

Use the following instructions to complete Form 3, Part 1:

1. Review the list of activities in Column B and identify those activities that occur at the installation. If the activity does not occur, you can either delete the column or leave it as a placeholder for future mission changes. For assistance in identifying range and training activities, refer to the EMS Aspect/Impact Methodology for Army Training Ranges available on the Defense Environmental Network and Information Exchange website at https://www.denix.osd.mil/denix/DOD/Library/EMS/ems.html.

2. Complete Columns A and D–H for each activity. You will need to create a new entry for each occurrence of the activity so you can document specific locations, identify any unique conditions or circumstances, and identify the waterbody in which the activity occurs. For example, if there are three small-arms ranges, you will need to insert two more lines and add their information in them.

    a. *Column A, Activity ID.* Enter the unique activity ID number, if any, for the activity. Be consistent with your DPW facility codes.

    b. *Column C, Land Use.* Typically you will not have to do anything in this field. However, if your DPW has different terminology or expanded categories for land use, work with it to determine the proper categories for each activity.

    c. *Column D, Specific Name of Activity.* Enter the formal name of the activity. Be as consistent as possible with other installation activity lists, as described above.

d. *Column E, Description of Activity.* Provide a detailed description of the activity and its operations. Include a note of how often the site is used for the activity—for example, "continuous," "daily," "monthly," or "sporadically." The amount will help you rate the activity's impact. Note any problems or concerns associated either directly with the activity or the land surrounding it, such as severe erosion from off-site sources or a continuous violation of a permit.

e. *Column F, Location.* Provide the location of the activity, preferable latitude and longitude, so that you can integrate it easily into a GIS system.

f. *Column G, Responsible Office.* Enter the office and point of contact that is *legally* responsible for the activity.

g. *Column H, Compliance Requirements.* Enter compliance requirements that regulate or permit the operation of the activity or its discharges, including permit numbers if applicable. Refer to Appendix B, which contains a list of the environmental laws and regulations associated with typical DoD installation activities, or check with your headquarters environmental service representative, EPA/state websites, the installation environmental office, or the office responsible for that activity.

h. *Columns I and J, Receiving Waterbody and WPS.* Determine the associated receiving waterbody or subwatersheds, identified on Form 1, Questions 6 and 7. Enter the name and corresponding WPS. You can determine the receiving waterbody by using GIS overlay maps of the installation and the watersheds. Another method is to use EPA's WATERS database to identify the installation and the waterbodies (this method is not as accurate as a topographic map that shows the watershed boundaries). You can be as detailed as you prefer, but link the name of the waterbody to one of the waterbodies identified in Form 1 so you can assign a WPS to the activity. (For example, you may wish to list the tributary the activity drains to, but you list a higher HUC level waterbody in Form 1. You will need to identify the higher HUC level waterbody as well in order to determine the activity's WPS.)

Identifying an activity's waterbody

When determining an activity's receiving waterbody, you can be as detailed as you prefer, but be sure to link the name of the waterbody to one of the waterbodies identified in Form 1 so you can assign a WPS to the activity.

For example, you may wish to list the tributary the activity drains to, but you list a higher HUC level waterbody in Form 1. You will need to identify the higher HUC level waterbody as well in order to determine the activity's WPS.

FORM 3, PART 2: INSTALLATION ACTIVITY DATA

Form 3, Part 2, allows you to record all of the information needed to assess each activity's impacts on the impaired watershed identified in Form 1. You will complete a Form 3, Part 2, for each activity prioritized by WPS validated in Form 1.

Although most of the information required to complete this form may already be available in existing reports, you should walk around the installation to document current conditions at each of the activities, as well as to talk to personnel in charge of each activity.

Form 3, Part 2, Scoring Instructions

Scoring your activities

Assigning an AIS will help you to rank your activities and their impacts to water resources. Ranking them allows you to easily identify those activities with the greatest impact, which will help you to prioritize solutions and mitigation actions.

To complete Form 3, Part 2, you will develop an AIS for each activity. The AIS enables you to develop a quantitative baseline of current installation activities that may contribute to waterbody impairments or adversely affect watershed health indicators. This information is particularly useful for installations located in areas where the state is developing TMDLs for impaired waterbodies. In addition, the process also supports users who are attempting to develop an EMS by creating a prioritized list of installation activities that have an environmental aspect and impact.

The AIS approach is based on current DoD, EPA, and Department of Energy risk-ranking systems and it draws particular aspects from the Air Force compliance through P2 approach. The user develops the activity impact "score" based on a matrix comparing severity of the impact and frequency of the impact. The AIS scoring system is meant to be as objective as possible without being too complex, while still relying on existing information and professional judgment.

When completing Form 3, Part 2, rely on your own technical expertise and installation sources when selecting a score. These instructions are for scoring the activity impacts to surface water, ground water, air, ecosystem, and compliance. To determine an activity's AIS, do the following:

- Review the risk assessment scoring matrixes in "Form 3, Part 2, Questions" for guidelines in determining which block to check.
- Select a likelihood of frequency or "LF" value from Table 3-1 based on a review of existing studies or professional judgment. The LF is an estimate of the likelihood of occurrence for an impact (1 chance in 100 events) or frequency of an activity (e.g., number of car washes conducted in a year).
- Select a corresponding "S" value in Tables 3-2 to 3-7 based on a review of existing studies or professional judgment. The "S" is an estimate of the severity (negligible to significant) of the impact if the event occurred, using the severity matrixes for each medium.
- Using the selected LF value and S value, identify the corresponding AIS, shown in Table 3-8. Mark the corresponding box for each applicable question on the form.

Table 3-1. Definitions of Likelihood of Occurrence or Frequency of Event Categories

LF0	= negligible likelihood (e.g., 1 chance in a million events) of release or impact occurring or there is no known plan to conduct the activity, which occurs less than once a decade
LF1	= improbable likelihood or low frequency (e.g., 1 chance in 100 events) of release or impact occurring or the activity takes place less than once a year
LF2	= probable likelihood or low frequency (e.g., 1 chance in 10 events) of release or impact
LF3	= very likely or high frequency (at least 1 chance in every 2 events or continuous) of release or impact such as a constant discharge

Form 3, Part 2, Questions

1. Surface water impact:

   a. Does the activity result in an industrial or domestic wastewater direct point source discharge to surface water that is regulated under the CWA? If so, then

      i) is the activity out of compliance with CWA regulations because it does not have an individual permit or is *not* included on the installation's permit?

      ii) if the activity is permitted, is it currently out of compliance with the permit standards?

      iii) has the activity had past recurring noncompliance with permit standards and/or conditions?

   b. Does the activity have a discharge from "regulated" point source stormwater runoff that contains sediment or other pollutants?

   c. Does the activity have runoff from non-point sources that contain sediment or other pollutants?

   d. Are the pollutants discharged from this activity to surface water the same as those pollutants listed on the state/EPA 303(d) list (TMDL) for this waterbody?

   e. Does the activity drain to a waterbody that is a source of drinking water?

   f. Is the activity located in a state-identified source water protection zone?

   g. Does the activity adversely affect flow of a waterbody with restrictions on water withdrawal or discharge volumes?

h. Do the streams or rivers near the activity exhibit visible signs of bank erosion, scouring, or unstable stream banks?

i. Does the area around the activity exhibit uncontrolled flooding during rain events?

j. Does the area around the activity contain streams or rivers without an adequate riparian buffer?

k. Does the area around the activity contain steep slopes or other areas that exhibit visible signs of erosion?

l. Is the activity affected by upstream properties or activities that may affect water quality or cause on-site flooding or stream scouring?

Use Table 3-2 in conjunction with Table 3-1 to select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-2. Definitions of Severity Categories for Potential Impacts to Surface Water Quality

S0	= the activity has no impact
S1	= minimal impact—for example, the activity results in a discharge of pollutant or other impairment that has minimal negative impact on surface waterbodies, including (1) the impact is contained to immediately around the activity and is temporary in duration, *and* (2) it does not result in a release of a 303(d)-listed waterbody impairment to waters of the state
S2	= moderate impact—for example, the activity causes discharge of pollutant or causes other impairment that has moderate impact on surface water, including (1) discharge or negative impairment is listed as a 303(d) pollutant or cause of waterbody impairment *and* impact is local in scale and parameter, *or* (2) discharge or negative impairment is not listed as a 303(d) pollutant or cause of waterbody impairment *and* impact is contained within the installation boundaries or is temporary in duration, *or* (3) discharge or negative impairment is not listed as a 303(d) pollutant or cause of waterbody impairment *and* impact is contained to immediately around activity or is temporary in duration, *but* waterbody is a source for potable water
S3	= significant impact—for example, the activity causes discharge of pollutant or causes other impairment that has significant impact on surface water, including (1) discharge or negative impact is listed as a 303(d) impairment *and* impact would be off-post or is persistent in nature, *or* (2) impact would cause the waterbody to not meet its intended purposes

2. Ground-water impact:

    a. Does the activity inject or have infiltration of a pollutant to ground water?

    b. Does the activity discharge pollutants that violate drinking water maximum contaminant limits (MCLs) or water discharge permit limits to ground water (if permitted)?

    c. Does the activity drain to ground waters that are a source of drinking water (aquifer or well)?

    d. Is the activity within 300 feet of a drinking water well or within a wellhead protection zone?

    Use Table 3-3 in conjunction with Table 3-1 to select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-3. Definitions of Severity Categories for Potential Impacts to Ground-Water Quality

S0	= activity reduces amount of parameter released to ground water
S1	= minimal impact—for example, activity causes discharge of pollutant or a negative impact on flooding or water supply, but discharge amount or negative impact is minimal
S2	= moderate impact—for example, activity causes discharge of pollutant or negative impact on flooding or water supply, but discharge or negative impact is on post, is temporary in nature, and parameter is not listed as a 303(d) pollutant or cause of waterbody impairment
S3	= significant impact—for example, activity causes discharge of pollutant or negative impact on flooding or water supply, but discharge or negative impact is listed as a 303(d) pollutant, aquifer is source water, scale of damage is off-post, or impact would cause waterbody to not meet its intended purposes

3. Air quality (also referred to as airshed) impact:

    a. Does the activity have nonpermitted discharges to air that are also TMDL-regulated pollutants?

    b. Does the activity have a permitted discharge to air that is also considered a TMDL-regulated pollutant? If so, is this air discharge in compliance with the Clean Air Act permit?

Use Table 3-4 in conjunction with Table 3-1 to select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-4. Definitions of Severity Categories for Potential Impacts to Air Quality

S0	= activity reduces amount of parameter released to air
S1	= minimal impact—for example, activity causes discharge of pollutant or negative impact air quality, but discharge amount or negative impact is minimal
S2	= moderate impact—for example, activity causes discharge of pollutant or negative impact air quality, but discharge does not migrate off-post *and* is in compliance with air standards
S3	= significant impact—for example, activity causes discharge of pollutant that has a negative impact on air quality, and discharge migrates off-post *and* is beyond guidelines set by air standards

4. Critical habitat impact:

   Does the activity disturb a sensitive/critical habitat or endangered species habitat?

5. Cultural resources impact:

   Does the activity adversely affect cultural resources or a historic property?

6. Health and safety impact:

   Does the activity discharge pollutants that pose a risk to worker or public health and/or safety?

   Use Table 3-5 in conjunction with Table 3-1 to select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-5. Definitions of Severity Categories for Potential Impacts to Questions 4–6

S0	= activity has positive impact on ecosystem/cultural resources/health and safety parameters
S1	= minimal impact—for example, activity causes minimal negative impact
S2	= moderate impact—for example, activity causes moderate negative impact, but only on post
S3	= significant impact—for example, activity causes significant negative impact, is regional in scale, or deals with sensitive areas or endangered species on post, *or* impact is on off-post habitats

7. Installation compliance burden impact:

   a. Will a new mission operation cause the activity to have a new pollutant discharge to water resources that will increase compliance requirements or liability?

   b. Does the activity require an environmental plan that calls for environmental management of discharges to water resources? If yes, has the plan been implemented? If so, has the plan been unsuccessful in reducing discharges of pollutants to water resources?

   c. Is the activity currently out of compliance with other environmental laws or regulations (e.g., RCRA; FIFRA; CERCLA), or has it had recurring noncompliance for any discharge, spill, or injection of a pollutant to water resources?

   Use Table 3-6 in conjunction with Table 3-1 to select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-6. Definitions of Severity Categories for Potential Impacts to Installation Compliance Burden

S0	= no impact—for example, activity has no compliance requirement and requires no permit or plan
S1	= minimal impact—for example, activity is governed by environmental regulations but has no regulatory requirement for a permit or plan to operate
S2	= moderate impact—for example, activity is governed by environmental regulations but has no regulatory requirement for a permit to operate, only a plan
S3	= significant impact—for example, activity is governed by environmental regulations and has a regulatory requirement for a permit and a plan to operate

8. Mission sustainability impact:

   Is this activity related to an encroachment issue?

   Use Table 3-7 in conjunction with Table 3-1 to select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-7. Definitions of Severity Categories for Potential Impacts to Mission Sustainability

S0	= activity is not affected by an encroachment issue
S1	= minimal impact—for example, activity slightly relates to an encroachment issue
S2	= moderate impact—for example, activity relates to an encroachment issue
S3	= significant impact—for example, activity is directly related to an encroachment issue

9. Identify other activity regulatory concerns or issues and select the appropriate color in Table 3-8. Then enter the corresponding answer on Form 3.

Table 3-8. Definitions of AIS Color Codes in Form 3

Combined "S" and "L" response	Answer for Form 3
Yes or known significant impact (S3+L3 or S3+L2 or S2+L3)	3 points (red)
High probability or uncertain impact (S1+L3 or S2+L2 or S3+L1)	2 points (pink)
Low probability but uncertain impact (S3+L0, S2+L1 or S1-L1 or S1+L2)	1 point (yellow)
No known or negligible impact (L0 or S0 in any combination)	0 points (green)

10. AIS score: The form will automatically calculate the AIS by summing your answers to the above answers.

11. TABS score: The form will automatically calculate the TABS, which equals the sum of the WPS and the AIS.

FORM 3, PART 3: ASSESS THE POTENTIAL FOR POLLUTION PREVENTION OPPORTUNITIES

This part of Form 3 allows you to identify those activities that are candidates for elimination, outsourcing, consolidation, process reengineering, material substitution, or other P2 approaches. Candidate activities are ones that exhibit a relatively higher burden-to-mission need ratio. In other words, they cause a high burden but have a low mission need. This approach is based on the hypothesis that an activity's total burden increases as the vulnerability of the ecosystem in which it operates increases. The following instructions will help you to complete Part 3 of Form 3. These are the activities that you should review for opportunities to reduce their impact by

- eliminating the activity,
- consolidating multiple activities,
- reengineering the activity, or
- implementing other P2 approaches.

1. Determine the mission need score (MNS) by selecting the appropriate score:

    a. Score of 1—indicating that the activity is completely unrelated to the mission of the organization, and/or mission readiness would not be adversely impacted at all if the activity ceased operations.

   b. Score of 5—indicating that the activity is related to the mission of the organization but is not critical. Also, mission readiness would not be significantly impacted if the activity ceased operations.

   c. Score of 10—indicating that the activity is critical to the mission of the organization. Also, mission readiness would be significantly impacted if the activity ceased operations.

2. The form will automatically determine the burden-to-mission need ratio by dividing the TABS by the MNS.

3. Check all the P2 options that may be appropriate for mitigating the impacts or compliance burden of the activity.

You complete the remainder of Form 3 as you proceed through the following chapters of this guide.

Form 3. Installation Activity Data Entry Sheet

Part 1: Describe the activity and its potential impacts, and identify its watershed or waterbody

1. Name of organization/functional area: 2. Name of facility: 3. Name of activity:	4. Describe activity:
5. Location(s): 6. Number of occurrences at this location:	
7. Responsible office and phone #:	8. Unique activity ID# or SIC#:
9. Describe current mitigation efforts and past restoration efforts (existing or planned):	10. Estimate annual operations and maintenance (O&M) cost of mitigation efforts:

11. Check the laws that regulate/permit the operation of the activity:
•CWA •RCRA •CAA •SDWA •EPCRA •NCA •NHPA •TSCA
•FIFRA •Sikes •ESA •CZMA •NEPA
State:_____
EO: _____
DoD:_____
Local:_____
Other:_____

12. List required permits and plans:
a. _____
b. _____
c. _____
d. _____

13. Subwatershed or waterbody name and 10th–12th level HUC #, Form 1, Question 6:	14. Subwatershed or waterbody WPS from Form 1, Question 6:

15. List the TMDL-regulated pollutants or 303(d)-listed pollutants of concern from Form 1 that are known or have the potential to be released by this activity.

Pollutant of concern	TMDL?		Sampled	Estimated
303(d) Impairment 1:	yes	no		
303(d) Impairment 2:	yes	no		
303(d) Impairment 3:	yes	no		
303(d) Impairment 4:	yes	no		
303(d) Impairment 5:	yes	no		
303(d) Impairment 6:	yes	no		

16. Check activity's other known (documented) or potential pollutant releases or impairments.

(Check "K" for known or "P" for potential and check all that apply.)

K/P
[ ]Release nutrient
[ ]Release BOD/COD
[ ]Release inorganic
[ ]Release metals
[ ]Release POLs
[ ]Uncontrolled storm-water runoff
[ ]Release pesticides

K/P
[ ]Release TSS
[ ]Cause erosion
[ ]Cause thermal pollution
[ ]Release pathogens
[ ]Disrupt potable supply
[ ]Release explosives
[ ]Potential spill
[ ]Release VOC/SVOC

K/P
[ ]Release SOx to air
[ ]Release NOx to air
[ ]Hazardous air pollutants
[ ]Greenhouse gas emission
[ ]Release PM 10 to air
[ ]Violate noise standards

K/P
[ ]Decrease riparian buffer
[ ]Introduce invasive species
[ ]Decrease wetlands
[ ]Decrease fish spawning range
[ ]Cause in-stream scouring
[ ]Cause flooding

Form 3 (continued)
Part 2: Quantify the activity's impact and mission need and determine the Total Activity Burden Score

Answer the following questions to develop the activity's AIS. Refer back to Questions 8, 9, 12, and 13 of Part 1 when answering questions below. For example, if pollutant is "known," then your answer will be "Yes" or "No." However, if a release of a pollutant is only "potential," then based on installation knowledge, your answer will either be "High" or "Low" probability. Note: Use your own technical expertise and installation sources to answer "Yes" or "No" to each of these questions. Use the Frequency Chart in the instructions to answer "High" or "Low" probability.		Yes = 3 pts	High probability = 2 pts	Low probability = 1 pt	No = 0 pts
1. Surface water impact	a. Does the activity result in an industrial or domestic wastewater direct point source discharge to surface waters that are regulated under the CWA? If so, then—				
	1. Is the activity out of compliance with CWA regulations because it does not have an individual permit or is *not* included on the installation's permit?				
	2. If the activity is permitted, is it currently out of compliance with the permit standards?				
	3. Has the activity had past recurring noncompliance with permit standards and/or conditions?				
	b. Does the activity have a discharge from "regulated" point source storm-water runoff that contains sediment or other pollutants?				
	c. Does the activity have runoff from non-point sources that contain sediment or other pollutants?				
	d. Are the pollutants discharged from this activity to surface water the same as those pollutants listed on the state/EPA 303 (d) lists (TMDL) for this waterbody?				
	e. Does the activity drain to a waterbody that is a source of drinking water?				
	f. Is the activity located in a state-identified source water protection zone?				
	g. Does the activity adversely affect flow of a waterbody with restrictions on water withdrawal or discharge volumes?				
	h. Do the streams or rivers near the activity exhibit visible signs of bank erosion, scouring, or unstable stream banks?				
	i. Does the area around the activity exhibit uncontrolled flooding during rain events?				
	j. Does the area around the activity contain streams or rivers without an adequate riparian buffer?				
	k. Does the area around the activity contain steep slopes or other areas that exhibit visible signs of erosion?				
	l. Is the activity affected by upstream properties or activities that may affect water quality or cause on-site flooding or stream scouring?				
2. Groundwater impact	a. Does the activity inject or have infiltration of a pollutant to ground water?				
	b. Does the activity discharge pollutants that violate drinking water MCLs or water discharge permit limits to ground water (if permitted)?				
	c. Does the activity drain to ground waters that are a source of drinking water (aquifer or well)?				
	d. Is the activity within 300 feet of a drinking water well or within a wellhead protection zone?				
3. Air quality impact	a. Does the activity have nonpermitted discharges to air that are also TMDL-regulated pollutants?				
	b. Does the activity have a permitted discharge to air that is also considered a TMDL-regulated pollutant? If so, is this air discharge in compliance with the CAA permit?				
4. Critical habitat impact	Does the activity disturb a sensitive/critical habitat or endangered species habitat?				
5. Cultural resource impact	Does the activity adversely affect cultural resources or a historic property?				
6. Health and safety impact	Does the activity discharge pollutants that pose a risk to worker or public health and/or safety?				
7. Installation compliance burden impact	a. Will a new mission operation cause the activity to have a new pollutant discharge to water resources that will increase compliance requirements or liability?				
	b. Does the activity require an environmental plan that calls for management of discharges to water resources? If yes, has the plan been implemented? If so, has the plan been successful in reducing discharges of pollutants to water resources?				
	c. Is the activity currently out of compliance with other environmental laws or regulations (e.g., RCRA, FIFRA, CERCLA), or has it had recurring noncompliance for any discharge, spill, or injection of a pollutant to water resources?				
8. Mission sustainability impact	Is this activity related to an encroachment issue?				
9. Identify other activity regulatory concerns or issues and rate the impact	a.				
	b.				
10. **AIS—**sum scores from Questions 1 to 9					
11. **Total Activity Burden Score = AIS + WPS**					

Form 3 (continued)			
Part 3: Assess the potential for pollution prevention opportunities			
1. **Activity's Mission Need Score.** Select either 1 (the activity is unrelated to the mission or mission readiness would not be adversely impacted at all if the activity ceased operations), 5 (the activity is somewhat related to the mission or mission readiness would be slightly adversely impacted if the activity ceased operations), or 10 (the activity is critical to the mission).	10	5	1
2. Calculate the activity's current **Burden-to-Mission Need Ratio,** which equals the TABS/MNS. (Higher ratios identify high burdens but activities with lower importance. These activities are excellent candidates for the P2 evaluations listed below.)			
3. Check the following P2 options that may be appropriate for mitigating the impacts or compliance burden of the activity: • eliminate activity •consolidate activity •outsource activity •implement process change •change materials			

Part 4: Determine project objectives		
Are enhanced mitigation efforts needed for this activity? Specifically, does the installation want to—	Yes	No
1. Meet specific regulatory, audit, mission, or other requirements?		
2. Reduce the amount of pollutants entering receiving waters?		
3. Reduce runoff velocities or mimic predevelopment runoff flow volumes?		
4. Improve reliability and ease of maintenance of existing BMPs?		
5. Comply with permit requirements (for pollutant removal or flow control)?		
6. Reduce life-cycle costs of existing operations or BMPs?		
7. Restore natural habitat or cultural resources?		
8. Meet troop readiness or installation sustainability requirements?		
9. Other (describe):		

Part 5: Select project BMP, estimate costs and source of funds		
1. Describe the selected mitigation project or BMP. If "Yes" to Part 4, provide the title of proposed BMP or control technology:	Cost data	$
	2. Estimated total startup costs	
	a. Estimated planning, design, and permitting costs	
	b. Estimated purchase/construction costs	
	3. Estimated O&M costs	
4. Estimate a reduction in the TABS, assuming that successful implementation of the enhanced mitigation effort uses the same scoring sheet as your original TABS (Part 2). Enter new TABS here:		
5. Calculate cost-effectiveness of proposed project = reduction in TABS score/total start costs:		
6. Provide reference to detailed project sheet:		
7. List most appropriate source of funds (list primary fund code such as O&M or MILCON):		
8. Is project eligible for non-O&M or MILCON funds (e.g., P2, DoD grants, EPA grants for demonstration projects, grants from other organizations)? If "Yes," list them:		

Part 6: Identify installation project lead and potential project partners			
1. Installation project lead office:		3. Contact phone:	
2. Point of contact name:		4. Contact e-mail:	
5. List potential installation/service, regulatory agency, citizen group, other partners:			
Organization name	Point of contact	Contact phone	Role in project
6. Attach a picture of the location, impairment, or activity:			
Form created by:	Date form created:	Form revised by:	Date form revised:

FORM 4: DEVELOP A SUMMARY OF INSTALLATION LAND-USE CATEGORIES

Watershed management involves gaining an understanding of the installation's land use and hydrological processes that govern the flow, quality, and velocity of water running onto and off of the site. Understanding this process requires, among other things, current data about the amount and type of installation land cover. Local watershed groups or regulators also may use these measurements as targets for watershed restoration goals (e.g., percent of stream miles containing adequate riparian buffer zones).

To complete Form 4, which creates a snapshot of your installation's land-use averages, you may have to review installation master plans, GIS layers, integrated natural resource plans, storm water pollution prevention plans, and range management plans. Once this is completed, you can compare the installation results to the surrounding watershed. Pay particular attention if the percentage of impervious areas on your installation is greater than the average value in the watershed. This may be an indication that the installation needs to investigate its current storm water control mechanisms and decrease impervious surfaces by increasing infiltration through the use of innovative storm water runoff methods such as low-impact development. Various studies have shown that as the amount of impervious areas increases in a watershed, its quality decreases. Therefore, installations should consider ways to mimic natural hydrology by further minimizing impervious areas, which reduces storm water runoff to predevelopment.

To complete Form 4, you also should

- refer to Form 3, Column C, to determine the total number of installation activities in each land-use category;
- work with installation master planners and facility engineers to determine acres and percentage of impervious surfaces for each activity and total installation acres for each land-use category; and
- calculate pervious and impervious percentages by dividing the total pervious or impervious acres by the total number of installation acres.

Obtain land-use goals, installation sustainability goals, and the watershed goals found in the master plan, those expressed by EPA, the state, or public/private watershed groups to determine and set installation goals. Enter the information into the form to compare the installation's land-use conditions with these goals.

Form 4. Summary of Installation Land-Use Categories
(Gray areas do not apply to that particular land-use category)

Description of installation land-use categories	Total # of installation activities in each category (refer to Form 3)	Total acres in each category	Total # of impervious acres	Total # of pervious acres	Total % impervious	Total % pervious	Acres covered by SWP3 or other plan (specify)	Acres of range land covered by erosion control management plan	Land-use improvement goal (%)	% of goal accomplished
Industrial (includes facility operations and maintenance areas, motor pools, equipment and material storage areas, truck parking, wash racks, fueling points, industrial treatment plants, fumigation areas, shipping/receiving areas)										
Urban (includes commercial—personal exchange, commissary, restaurants, banks, parking; residential—housing and parking; office buildings and parking; and roads)										
Mixed use (includes yards, parade grounds, flower beds, gravel areas, and low-impact parking lots; total semi-maintained open grounds—such as operational buffers and firebreaks; and recreational grounds—such as ball fields, horse stables, and golf courses)										
Construction (includes construction by military personnel and contractors)										
Agricultural operations										
Military operations and range lands including—										
Small-arms ranges										
Artillery or other live-fire impact areas and missile launch areas										
Training and maneuver areas										
Other military activities										
Natural areas including—										
Nonriparian forest										
Riparian forest and buffer strip										
Wetlands										
Grasslands or prairie										
Endangered species conservation areas										
Waterbodies (stream, pond, or other)										
Coastal area or estuary										
Other natural areas (e.g., beaches and deserts)										
Acres of natural areas slated as protected critical areas										
Total facility or installation size (add up each column):										
Local land use, sustainability, or watershed goals comparison										
Installation baseline conducted by:							**Date conducted:**			

Chapter 4
Select Mitigation Projects for High-Priority Installation Activities

INTRODUCTION

Once you have created an inventory of current activities, described the current mitigation efforts in place (Form 3, Parts 1 and 2), identified high-priority activities and whether the activity is a P2 candidate (Form 3, Part 3), you can now determine if enhanced mitigation efforts are necessary. This chapter provides instructions on how to complete Parts 4 and 5 of Form 3 by

- determining potential P2 opportunities;
- selecting the performance objectives for the potential BMP;
- assessing the feasibility of implementing enhanced mitigation projects such as structural or nonstructural best BMPs;
- selecting the most appropriate BMP;
- identifying performance, design, construction, maintenance, and cost factors for the selected BMP; and
- developing cost estimates.

This chapter also lends additional assistance in identifying and selecting BMPs for typical activities. Table 4-1 and Appendix C contain an expanded list of available BMP guidance.

Table 4-1. Typical BMPs and Mitigation Efforts for High-Priority DoD Activities

Typical DoD activity	Typical mitigation activities	References for additional BMP data
Artillery or other live-fire impact areas	▪ Construct berms in a concrete basin ▪ Use epoxy paints to ensure that runoff does not pollute ground water ▪ Install a bag-house over targets to draw in lead-contaminated air ▪ Buffer the target zone with vegetation to filter runoff ▪ Rotate training on grounds to mitigate impacts on land	▪ EPA (http://www.epa.gov/owm/sw/construction/#) ▪ CERL methods (http://www.cecer.army.mil/ll/sedspec/design/DisplayPrac.cfm?PKeyPractice=16&FromUse=11)
Buildings	▪ Use low-impact development technologies ▪ Use proper erosion and sediment controls during construction operations ▪ Install sand filters ▪ Redirect roof runoff	▪ Whole building design guide for environmentally sound site layout (http://www.wbdg.org/index.asp) ▪ EPA's Watershed Academy Module on Land Development (http://www.epa.gov/watertrain/modules.html) ▪ Stormwater Manager's Resource Center (http://www.stormwatercenter.net/) ▪ Low Impact Development Center (http://lowimpactdevelopment.org/)
Construction and other ground-disturbing activities	▪ Control erosion—stabilizing exposed soils prevents stormwater run-on and runoff (use geotextile materials wherever appropriate to prevent erosion) ▪ Use dry detention basins ▪ Cover excavated soils ▪ Remove contaminated soils and dispose of properly	▪ EPA Stormwater Construction and Development (http://www.epa.gov/OST/guide/construction/links.html) ▪ NRCS planning and design manual for the control of erosion, sediment, and storm water (http://abe.msstate.edu/csd/p-dm/index.html)
Dams, culverts, or dredging	▪ Regularly check effectiveness of dams and culverts ▪ Ensure proper placement of fill activities for dredging	▪ Stormwater Manager's Resource Center (http://www.stormwatercenter.net/)
De-icing material application	▪ Reduce use and/or replace with environmentally friendly materials ▪ Collect and reuse materials (e.g., aircraft de-icing)	▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm) ▪ NASA Water Pollution Control (http://www.wff.nasa.gov/~code205/Services/Water_Pollution/water_pollution_control.htm) ▪ New Hampshire Department for Environmental Services (http://www.des.state.nh.us/wmb.htm)
Drainage wells and canals	▪ Construct vegetative strip and filters—catches sediment before it reaches the infiltration device ▪ Perform required maintenance and cleaning primarily to prevent clogging	▪ EPA's general BMPs (http://www.purdue.edu/dp/envirosoft/inject/src/main.htm)

Table 4-1. Typical BMPs and Mitigation Efforts for High-Priority DoD Activities

Typical DoD activity	Typical mitigation activities	References for additional BMP data
Fixed-wing and rotary-wing aircraft maintenance activities	▪ Use separate containers for disposal of wastes ▪ Recycle scrap metal ▪ Dispose of degreasing and other solvent materials properly ▪ Store containers on an impervious surface and properly cover against weather ▪ Provide equipment training	▪ NASA Water Pollution Control (http://www.wff.nasa.gov/~code205/Services/Water_Pollution/water_pollution_control.htm) ▪ Aerospace Industry Notebook (http://es.epa.gov/oeca/sector/sectornote/pdf/aersn.pdf) ▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm)
Fueling stations and operations	▪ Connect drains from vehicle washing areas to the municipal sewer or sanitary sewer system ▪ Provide temporary protection of storm drains (temporary placement of absorbent material, storm drain covers, or shutoff valves) ▪ Equip fueling equipment with automatic shutoff nozzles ▪ Discourage topping off and unattended fueling ▪ Install oil-water separators or sand filters	▪ EPA BMP database (http://www.bmpdatabase.org/) ▪ Stormwater Manager's Resource Center (http://www.stormwatercenter.net/) ▪ Maryland Stormwater Management Program (http://www.mde.state.md.us/environment/wma/ stormwatermanual/) ▪ EPA's general BMPs (http://www.purdue.edu/dp/envirosoft/inject/src/main.htm)
Motor pools and vehicle maintenance centers	▪ Park tank trucks or delivery vehicles away from unprotected storm drains or manholes, or provide temporary protection ▪ Install sand filters, oil-water separators, or other BMPs that treat the runoff ▪ Perform maintenance inside or in an outside area where spills cannot enter storm drains	▪ EPA "Solutions to Pollution" (http://www.epa.nsw.gov.au/small_business/autoservicing.htm) ▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm)
NPDES-permitted industrial point source discharges	▪ Participate in basinwide management plans that allow tradeoffs for maximum ecological and economic benefits (Great Lakes and Chesapeake Bay programs are examples of major "holistic" plans) ▪ Involve community, schools, and other citizens in water sampling (Streamwatch, etc.)	▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm) ▪ EPA industrial activities (http://wcfpub.epa.gov/npdes/stormwater/indust.cfm) ▪ EPA BMP database (http://www.bmpdatabase.org/)

Table 4-1. Typical BMPs and Mitigation Efforts for High-Priority DoD Activities

Typical DoD activity	Typical mitigation activities	References for additional BMP data
Nonpermitted mobile sources	▪ Establish shared and alternative transportation programs to reduce air emissions and traffic congestion and to conserve energy ▪ Increase use of parking spaces and pedestrian crossings	▪ Air Pollution Prevention Guide (https://www.denix.osd.mil/denix/DOD/Library/Air/Airmgt/aqtoc.html)
NPDES storm-water discharges	▪ Implement storm-water BMPs, including bioengineered and low-impact development approaches that combine hydrologically functional site designs with pollution prevention measures to reduce negative impacts on hydrology and water quality (LID projects apply a "natural remedy" to prevent potential problems, thereby reducing high costs of some conventional types of construction techniques)	▪ EPA's Office of Wastewater's storm-water BMP fact sheets (http:///cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm) ▪ State of Maryland stormwater BMP design manual (http://www.mde.state.md.us/environment/wma/stormwatermanual/index.html) ▪ Low Impact Development Center (http://lowimpactdevelopment.org/) ▪ EPA industrial activities (http://www.cfpub.epa.gov/npdes/stormwater/indust.cfm) ▪ Planning and design manual for the control of erosion, sediment, and storm water (http://abe.msstate.edu/csd/p-dm/index.html)
Open burning/open detonation sites	▪ Review EPCRA TRI inventory requirements for toxic releases and disposal ▪ Implement SWPPP—see standard industrial classification code for requirements regarding disposal of pollutant materials ▪ Utilize long-term containment measures, such as terra-forming or biofiltration strips ▪ Store containers on an impervious surface and properly cover against weather ▪ Check fuel moisture requirements and weather criteria for "burn days"	▪ NASA Water Pollution Control (http://www.wff.nasa.gov/~code205/Services/Water_Pollution/water_pollution_control.htm) ▪ NASA Hazardous Waste (http://www.wff.nasa.gov/~code205/Services/hazwaste/hazardous_waste.htm) ▪ Prevention of Lead Migration and Erosion from Small Arms Ranges (http://aec.army.mil/usaec/technology/rangexxi03d.html)

Table 4-1. Typical BMPs and Mitigation Efforts for High-Priority DoD Activities

Typical DoD activity	Typical mitigation activities	References for additional BMP data
Paved roads, parking lots, railroads, curbs, and sidewalks	▪ Use low-impact development technologies ▪ Replace impervious materials with pervious materials (e.g., permeable pavers or pavement) ▪ Install sand filters—used to treat stormwater runoff from large buildings, access roads, and parking lots ▪ Eliminate curbs ▪ Treat runoff in vegetated swales ▪ Increase pervious areas—replace shoulder area with pervious materials such as gravel	▪ Low Impact Development Center (http://lowimpactdevelopment.org/) ▪ Stormwater Manager's Resource Center (http://www.stormwatercenter.net/)
Permitted stationary sources	▪ Implement air pollutant control BMPs	▪ Air Pollution Prevention Guide (https://www.denix.osd.mil/denix/DOD/Library/Air/Airmgt/aqtoc.html) ▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm)
Septic systems or Class V wells	▪ Recycle and reuse wastewater ▪ Collect and recycle petroleum-based fluids, coolants, and battery acids drained from vehicles ▪ Wash parts in self-contained, recirculating solvent sink, with spent solvents being recovered and replaced by the supplier ▪ Use absorbents to clean up minor leaks and spills, and place used materials in approved waste containers, disposing of them properly ▪ Use a wet vacuum or mop to pick up accumulated rain or snow melt ▪ Regularly pump, inspect, and maintain wells ▪ Connect floor drains to permitted treatment works ▪ Replace with advanced treatment technologies or hookup to POTW	▪ EPA (http://www.epa.gov/safewater/uic/index.html) ▪ Minnesota's Individual Treatment Systems Program (http://www.pca.state.mn.us/programs/ists/index.html) ▪ EPA BMPs Class V wells (http://www.epa.gov/safewater/uic/classv.html) ▪ Rhode Island Checkup (http://www.state.ri.us/dem/pubs/regs/regs/water/isdsbook.pdf)

Table 4-1. Typical BMPs and Mitigation Efforts for High-Priority DoD Activities

Typical DoD activity	Typical mitigation activities	References for additional BMP data
Ship building, maintenance, and repair	▪ Use separate containers for disposal of wastes (many processes include potentially hazardous, toxic, corrosive, highly volatile, or flammable materials and should be clearly labeled and properly disposed) ▪ Recycle scrap metal ▪ Properly dispose of degreasing and other solvent materials to avoid direct discharge into waste streams ▪ Store containers on an impervious surface and properly cover against weather ▪ Provide equipment training	▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm) ▪ NASA Hazardous Waste (http://www.wff.nasa.gov/~code205/Services/hazwaste/hazardous_waste.htm) ▪ EPA Municipal Technologies (http://www.epa.gov/owmitnet/mtb/index.htm) ▪ EPA "Solutions to Pollution" (http://www.epa.nsw.gov.au/small_business/autoservicing.htm)
Training and maneuver areas	▪ Keep vegetative cover ▪ Conduct scheduled maintenance of grounds ▪ Use environmentally friendly low-water crossing designs	▪ EPA's Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads (http://www.epa.gov/owow/nps/unpavedroads.html ▪ Road and Management and Engineering Journal (http://www.usroads.com/journals/rmej/9806/rm980604.htm) ▪ Seneca Mineral (http://www.senecamineral.com/) ▪ CERL Soil and Erosion Control (http://owww.cecer.army.mil/ll/sedspec/index.cfm) ▪ Army Training and Testing Area Carrying Capacity methodology (http://www.aec.army.mil/usaec/publicaffairs/update/spr01/spr0108.htm)[a]
Unpaved and service roads	▪ Keep vegetative cover ▪ Conduct scheduled maintenance of grounds ▪ Use environmentally friendly low-water crossing designs	▪ EPA's Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads (http://www.epa.gov/owow/nps/unpavedroads.html) ▪ Road Management & Engineering Journal (http://www.usroads.com/journals/rmej/9806/rm980604.htm) ▪ Seneca Mineral (http://www.senecamineral.com/icedustcontrolproducts.htm) ▪ CERL Soil and Erosion Control (http://el.erdc.usace.army.mil/emrrp/emris/emrishelp/best_management_practices_project_implementation_and_mgmt.htm)

Table 4-1. Typical BMPs and Mitigation Efforts for High-Priority DoD Activities

Typical DoD activity	Typical mitigation activities	References for additional BMP data
Underground storage tank (UST) leaks	▪ Meet UST requirements—certify that tanks and piping are installed properly according to industry codes; install devices that prevent spills and overfills; protect tanks and piping from corrosion; and install leak detection systems	▪ DoD Joint Services P2 Library (http://p2library.nfesc.navy.mil/index.htm) ▪ NCSU's UST non-point source control fact sheets (http://h2osparc.wq.ncsu.edu/wetland/aqlife/ugrdtank.html)
Water supply or ground-water withdrawal wells treatment	▪ Consider the effects of the cone of depression on adjacent users and uses ▪ Consider the downstream effects of the pumped water and soil salinity ▪ Implement water conservation efforts including facility and grounds areas	▪ U.S. Army Source Water Protection Guide (http://water.usgs.gov/usaec/) ▪ EPA's general BMPs (http://www.purdue.edu/dp/envirosoft/inject/src/main.htm)

Note: CERL = Construction Engineering Research Laboratories; NRCS = National Resources Conservation Service; NPDES = National Pollutant Discharge Elimination System; LID = Low Impact Development; EPCRA = Emergency Planning and Community Right-to-Know Act; TRI = Toxics Release Inventory; NASA = National Aeronautics and Space Administration; NCSS = North Carolina State Univerity; and POTW = Publicly Owned Treatment Works.

[a] Army Training and Testing Area Carrying Capacity (ATTACC) methodology can be used to assess the training and carrying capacity that a given parcel of land can accommodate in a sustainable manner. Specifically, the ATTACC tool is used to estimate training land carrying capacity by relating training load, land condition, and land maintenance practices; to provide decision support to the installation training land manager and the installation staff for optimizing training land usage, while minimizing repair and maintenance requirements; and to provide a means for estimating future land rehabilitation and maintenance costs of land-based training requirements, by considering the costs of land maintenance practices and expected training land usage.

SELECTING THE BEST MITIGATION EFFORTS OR BEST MANAGEMENT PRACTICES FOR THE HIGHEST PRIORITY ACTIVITIES

Selecting the best BMP or group of BMPs for an activity or site identified on the installation can be difficult, especially in the project's conceptual phase. In general, a BMP should be chosen based on its ability to cost-effectively achieve site-specific objectives.

The following factors should be considered[1] when selecting appropriate BMPs:

- Regulatory requirements
- Internal and external audit findings
- Activity compliance status

[1] This approach is based on the Center for Watershed Protection and the Maryland Department of the Environment Water Management Administration, *Maryland Department of Environment's 2000 Maryland Stormwater Design Manual, Volumes I & II,* located at http://www.mde.state.md.us/environment/wma/stormwatermanual/Manual_CD/Introduction.pdf.

- Watershed
- Terrain
- Storm water treatment suitability
- Physical feasibility
- Community and environment
- Location and permitting factors.

More detail on a step-by-step screening process is provided below.

Form 3, Part 4: Determine Project Objectives

This part of Form 3 helps you determine if enhanced mitigation efforts are needed at the installation activity. From your answers, you also will be able to determine the BMP objectives. The following instructions will help you complete Part 4 of Form 3 for each priority activity at your site. In answering the questions in Part 4, you should review your answers to Parts 1 and 2 of Form 3.

1. *Does the installation have to meet specific regulatory, audit, mission, or other requirements?* To answer this question, you should confer with the installation's environmental and operational staff.

2. *Does the installation want to reduce the amount of pollutants entering receiving waters?* At a minimum, if you noted in Form 3, Part 2, that the activity discharges a pollutant of concern, answer "Yes."

3. *Does the installation want to reduce runoff velocities or mimic predevelopment runoff flow volumes?* At a minimum, if you answered "Yes" to any of the surface water impact questions or checked "cause erosion" or "uncontrolled stormwater runoff" in Form 3, Part 2, answer "Yes."

4. *Does the installation want to improve reliability and ease of maintenance of existing BMPs?* To answer this question, you should confer with the installation's maintenance staff.

5. *Does the installation want to achieve permit requirements (for pollutant removal or flow control)?* At a minimum, if the activity is affected by a NPDES permit, answer "Yes."

6. *Does the installation want to reduce life-cycle costs of existing operations or BMPs?* To answer this question, you should confer with the activities maintenance staff for suggested improvements.

7. *Does the installation want to restore a natural habitat or cultural resource?* To answer this question, confer with the installation's natural resource or cultural resource manager to determine if the activity affects a natural habitat or cultural resources and if there is an opportunity to restore the natural habitat on or surrounding it.

8. *Does the installation have to meet training or mission requirements*? To answer this question, confer with the installation's operations and DPW to determine if the activity affects the installation's training requirements, mission readiness, or installation sustainability. Talk with them for suggested improvements.

9. *Does the installation have other objectives?* Describe any other objectives not addressed above.

    a. *State, local, or other special considerations*. Is the project located in a part of the installation or watershed that has special design objectives or constraints that must be met? Your state may have specific requirements that must be met. Check with your state's regulations and water quality handbooks.

    b. *Terrain*. Is the project located in a portion of the state that has particular design constraints imposed by local terrain and/or underlying geology? The *Maryland Stormwater Design Manual*, *Volumes I & II*, details BMP restrictions for regions that have karst, mountainous terrain, or low relief.

    c. *Storm water treatment suitability*. Can the BMP meet storm water sizing criteria at the site, or is a combination of BMPs needed? It is important that the solution meet sizing criteria. Designers can screen the BMP list using local sizing criteria for volume and flow to determine if the solution will work.

    d. *Physical feasibility*. Are there any physical constraints at the project site that may restrict or preclude the use of a particular BMP? In this step, designers can determine if the soils, water table, drainage area, slope, or head conditions present at a particular development site might limit the use of a BMP.

    e. *Community and environment*. Do the remaining BMPs have any important community or environmental benefits or drawbacks that might influence the selection process? The *Maryland Stormwater Design Manual* contains a checklist to compare BMP options with regard to maintenance, habitat, community acceptance, cost, and other environmental factors.

f. *Location and permitting factors*. What environmental features must be avoided or considered when locating the BMP system at a site to fully comply with local, state, and federal regulations? In this step, designers may use Table 4.6 of the *Maryland Stormwater Design Manual* as a checklist that asks whether any of the following are present at the site: wetlands, waters of the United States, stream or shoreline buffers, floodplains, forest conservation areas, and development infrastructure. The manual provides guidance on how to locate BMPs to avoid impacts to sensitive resources. If a BMP must be located within a sensitive environmental area, the manual provides a brief summary of applicable permit requirements.

Factors in Selecting Project Objectives

When selecting objectives, the installation staff should be fully aware of the situation for which the BMP is being considered. Installations start the BMP selection process for different reasons, which include the following:

- *New construction or activity:* BMPs are selected to control the estimated runoff rates or pollutant loadings as part of a site development plan for new construction or a new activity. In these situations, installation managers usually have longer planning horizons and more influence in layout and BMP selection. However, most states provide minimum design and regulatory standards for BMPs proposed as part of new construction.

- *Retrofit existing activities or developed area:*

  - BMPs are selected to control known (sampled) runoff flow rates or pollutant loadings as a retrofit to an existing single industrial activity. Installation managers usually have shorter planning horizons due to the compliance agreements and less latitude in selecting BMPs due to space and operational constraints. All states provide regulatory criteria for controlling point source discharges from existing industrial activities. In addition to regulating point source discharges, some states provide regulatory criteria for controlling runoff flows.

  - BMPs are selected to control known (sampled) runoff flow rates or pollutant loadings as a retrofit to an existing multiple-use developed site (e.g., containing both industrial activities and typical urban land uses). Installation managers usually have medium planning horizons due to the complex nature of the solutions and more latitude in selecting BMPs or groups of BMPs. In addition to regulating point source discharges, some states provide standards for controlling runoff flows.

- *Restore natural habitat on an installation:* BMPs are selected to modify a habitat (e.g., in streams, wetlands, or riparian buffers) to restore natural predevelopment conditions or to mitigate the impacts on current development conditions. Installation managers should only implement these types of BMPs after upstream flows and pollutant loadings are controlled.

- *Meet troop readiness or mission requirements:* BMPs are selected to meet new or deficient training or installation mission requirements. For example, a BMP may be needed to mitigate the effects of encroachment on range use.

Refer to Parts 1 and 2 of Form 3 to review the impacts caused by a specific installation activity.

Form 3, Part 5: Selecting the Best Solution

Using the results obtained in the previous steps, you can choose the most appropriate solution to eliminate or reduce the impacts of the activity to the watershed and environment. For each proposed project, determine the cost-effectiveness to mitigate the target watershed (or waterbody) impairments and meet installation EMS and sustainability objectives. Factors that influence the BMP solutions chosen can include the effectiveness at eliminating the problem, the return on investment, whether they are achievable with installation resources, and maintenance considerations.

Use the following steps in filling out Form 3, Part 5, to select the BMPs and determine costs and sources of funds (note that the column names, e.g., Column BF, refer to the column headings in the electronic Form 3 found in Appendix A):

What to do if multiple mitigation efforts are possible?

If multiple mitigation efforts are possible for a particular activity, select the alternative that provides the greatest reduction in TABS per dollar spent.

1. Review Table 4-1, Appendix C, and state storm water guides to determine the types of BMPs available for high-priority DoD activities. Consider the physical characteristics of the site (refer to Form 3) when selecting a BMP.

2. Based on your assessment, select a mitigation effort(s) that provides the most cost-effective impact reduction. Enter the name and a description of the proposed mitigation effort. Describe the proposed BMP or control technology that can better mitigate the activity's impact.

3. For each mitigation project considered, calculate its

   a. planning, design, and permitting costs (enter figure in Column BF);

   b. purchase price/construction costs (enter figure in Column BG);

c. estimated startup costs (enter figure in Column BH); and

d. annual O&M costs (enter figure in Column BI).

Appendix C contains references for costing out BMPs relevant to DoD activities.

4. Rescore the activity's baseline score using the same scoring approach that you used in Part 2 of Form 3. Estimate your answers as if the proposed BMP was in place. Enter the new TABS in Column BJ.

5. The form will automatically calculate the cost-effectiveness of the proposed project by dividing the reduction in TABS score by the total start costs in Column BK.

6. In Column BL, note the project sheet number that contains the detailed project description. Because Form 3, Part 4, contains just a summary description, you will need to prepare a detailed project summary sheet or project description.

7. In Column BM, enter the appropriate source of funds.

8. In Column BN, enter whether the project is eligible for non-O&M or Military Construction (MILCON) funds (e.g., P2, DoD grants, EPA grants for demonstration projects, grants from other organizations).

Chapter 5
Develop Partnerships

INTRODUCTION

Many installations are short staffed and have too many initiatives and too few funds. Developing partnerships can help your installation accomplish its management objectives in a cost-effective manner. Partnering is not new to DoD, especially in the environmental programs. Installations can partner with regulators, other federal agencies, state and local governments, foreign governments, and citizen groups to accomplish various environmental objectives, share resources, access expertise, and resolve regulatory issues. In addition, environmental offices can partner with other installation offices, such as range management or logistics, to accomplish complex or integrated projects.

WHY FORM PARTNERSHIPS?

A partnership is the easiest way to develop and implement a successful watershed management plan because everyone is involved from the onset of the project. This means the ultimate plan will truly have the consensus of all parties who have a stake in the watershed. In general, forming partnerships with others can help do the following:

- *Lower project costs.* If other parties are already involved in the project, you can reduce the time it takes for approvals, improve logistical support, and obtain volunteer labor or technical assistance. Saving time also means saving money.

- *Build good community relations.* Partners will relay their positive experiences to others within the community.

- *Build advocates for your program.* Other installation offices or the public can be powerful advocates for change if involved from the beginning of projects.

- *Obtain additional funds (subject to federal fiscal legal restraints).* Other installation offices, DoD agencies, federal agencies, state and local governments, local businesses, or citizen groups may be interested in sharing costs on environmental projects.

- *Receive awards and rewards*. DoD management, from the installation commander to the Secretary of Defense, is very supportive of partnerships and often rewards positive partnering efforts.
- *Coordinate volunteers to conduct monitoring, stream cleanup, and stream or watershed restoration days.*
- *Provide technical expertise for demonstration projects.*
- *Coordinate and conduct field trips and tours.*
- *Establish and run meetings and workshops.*
- *Develop focus groups.*
- *Conduct opinion surveys.*
- *Provide media relations.*
- *Support and develop educational programs for schools, civic groups, and other local organizations.*

Partnerships also can be challenging. It takes time and skill to create successful partnerships. Maintaining motivation and enthusiasm is another challenge, especially if positive results do not happen quickly. All relevant stakeholders must believe their efforts are necessary. As you build partnerships, you will encounter these and other challenges. Keep in mind, however, that the benefits of partnerships usually far outweigh the challenges.

WHAT ARE THE STEPS?

There are some basic steps in forming and building partnerships:

- Identify opportunities that lend themselves to partnering.
- Identify potential partners.
- Develop partnerships.
- Collaborate to implement the projects.
- Share success and praise with outside stakeholders.

Identify Opportunities

The first step is to identify opportunities that lend themselves to partnering. By completing the forms in the Protocol, you have already identified those activities and solutions that could benefit from partners.

Identify Potential Partners

Ways to identify potential project partners vary. For example, DoD, EPA, and a variety of nongovernmental organizations have developed a catalog of organizations involved in protecting local waterbodies, including government agencies, formal watershed alliances, national groups, local groups, and schools that conduct activities such as volunteer monitoring, cleanups, and restoration projects.

In addition, many websites offer access to organizations that can assist your efforts:

- EPA hosts a "Catalogue of Watershed Groups" website, located at http://www.epa.gov/adopt/network.html. This site contains
  - the group name and website (if available);
  - a contact name, address, e-mail address, and phone number;
  - the watershed and locations of interest;
  - a description of activities; and
  - the number of volunteers.
- EPA also hosts a "River Corridors and Wetlands Restoration (RCWR) Partnership" website, located at http://www.epa.gov/owow/wetlands/restore/rpart.htm. The RCWR is an ad hoc team that consists of public agencies and private organizations that engage in wetland and watershed restoration efforts and are interested in sharing information and finding opportunities for collaboration. The purpose of the team is to promote and support community-based projects that improve the quality of life of the community and the health of their watersheds. EPA recognizes that restoration efforts require a team approach and welcomes any national organization with similar interests to join the RCWR.

Use Form 3, Part 6, for tracking projects with partners. The following instructions will help you to complete Part 6 of Form 3. Identify potential partners for your projects by referring to http://www.epa.gov/win/contacts.html. List these partners and their information in Form 3, Part 6.

1. Attach any pictures and maps of the project or information related to the project and note the information for easy reference on the project site.
2. Initial or sign the name of the person who completed the form.

3. Date the form.

4. Initial or sign the form when it is revised and include the revision date.

Develop Partnerships

Successful partnerships should include the following key elements:

- Clear communication of objectives and identification of opportunities for shared interests in project write-ups and execution
- Establishment of clear roles and responsibilities
- A written agreement between partners.

For detailed guidance on building local partnerships, you may want to review the following resources:

- *Resources for Integrated Natural Resources Management Plan Implementation—A Handbook for the DoD Natural Resources Manager*, Office of the Deputy Under Secretary of Defense for Environmental Security, January 2002. This document is located on the DENIX website at https://www.denix.osd.mil/denix/Public/ESPrograms/Conservation/Legacy/INRMP/inrmphb.pdf.
- *Partners for Research & Resource Management on Military Installations*, Sarah G. Bishop, Ph.D., October 1994. This information is located on the DENIX website at https://www.denix.osd.mil/denix/Public/ESPrograms/Conservation/Partners/partners.html.
- *Building Local Partnerships: A Guide for Watershed Partnerships*, Conservation Technology Information Center. This information is located on the "Know Your Watershed" website at http://www.ctic.purdue.edu/KYW/Brochures/BuildingLocal.html.

Tip

Just as important as forming partnerships with citizen groups is the formation of a good working relationship with other federal agencies and regulators.

Final Steps

The final steps are to collaborate with the identified partners to implement the project and to share the success of the partnership effort and project success with outside stakeholders.

Working with Other Federal Agencies and Regulators

Just as important as forming partnerships with citizen groups is the formation of a good working relationship with other federal agencies and regulators. You can

work with other federal agencies to obtain technical assistance, establish standard approaches, and share resources. You can work with your state and local regulators to determine appropriate TMDLs and to establish and participate in an effluent trading program.

Working with Other Federal Agencies

DoD has partnered with many federal agencies over the years to promote and achieve sustainable installations through regional ecosystem management. DoD's recent efforts to promote watershed management across DoD installations, share resources and technical knowledge with other federal agencies, and establish a federal standard approach for watershed assessments will provide additional opportunities to partner with federal agencies to solve complex problems to achieve an environment that is sustained, waterways that are preserved, and resources that are ecologically sound. Many of our installations' neighbors are federal agencies, such as the Bureau of Land Management and the Forestry Service. This presents opportunities to work closely with our neighbors to identify, reduce, or eliminate some of the watersheds' impairments through shared resources and approaches.

Working with Regulators During TMDL Determinations

Summary

You can and should participate in the TMDL determination process. The information in your watershed assessment plan will provide you with all necessary information during the TMDL determination process.

DoD installations may have the opportunity to work with EPA and state regulatory officials during the state TMDL determination process. A TMDL provides the water quality analysis and planning process for determining the specific pollution reductions that are necessary to attain or maintain water quality standards. The TMDL process includes legal requirements for public participation and implementation through NPDES permits.

By working with regulators during the TMDL determination process, you may have the opportunity to negotiate a tradeoff between reduced NPDES point source permit limits with changes in land management, or non-point source management practices. Therefore, you can and should participate in the TMDL determination process. The information in your watershed assessment plan will provide you with all necessary information during the TMDL determination process.

Working with Regulators to Establish Effluent Trading

Since the early 1990s, EPA has been promoting the use of effluent trading to achieve water quality objectives and standards within watersheds. This section describes EPA's 2003 policy on effluent trading in watersheds, discusses the benefits of trading, presents an explanation of several types of effluent trading, and outlines how EPA encourages trading. This policy is EPA guidance only and does not establish or affect legal rights or obligations. Agency decisions in any particular case still will be made by applying the law and regulations on the basis of specific facts when permits are issued.

Effluent trading supplements the current regulatory approach. It is a method to attain and/or maintain water quality standards by allowing sources of pollution to achieve pollutant reductions through substituting a cost-effective and enforceable mix of controls on other sources of discharge. As EPA improves its understanding of the opportunities afforded by watershed-based decision making, it will provide information for additional forms of trading.

EPA'S 2003 WATER QUALITY TRADING POLICY

This policy actively supports and promotes effluent trading within watersheds to achieve water quality objectives, including water quality standards, to the extent authorized by the CWA and other implementing regulations. The purpose of this policy is to encourage states, interstate agencies, and tribes to develop and implement water quality trading programs for nutrients, sediments, and other pollutants where opportunities exist to achieve water quality improvements at reduced costs. More specifically, the policy is intended to encourage voluntary trading programs that facilitate implementation of TMDLs, reduce the costs of compliance with CWA regulations, establish incentives for voluntary reductions, and promote watershed-based initiatives. The Water Quality Trading Policy and accompanying handbook can be downloaded from the EPA website at http://www.epa.gov/owow/watershed/trading.htm.

BENEFITS

EPA's support of watershed-based trading is anchored to a strong commitment to achieve and maintain water quality standards. EPA believes that trading is an innovative way for community stakeholders (e.g., regulated sources, nonregulated sources, regulatory agencies, and the public) to develop more "commonsense" solutions to water quality problems in their watersheds. Effluent trading potentially offers a number of economic, environmental, and social benefits.

- Economic benefits:
  - Reduces costs for individual sources contributing to water quality problems
  - Allows dischargers to take advantage of economies of scale and treatment efficiencies that vary from source to source
  - Reduces the overall cost of addressing water quality problems in the watershed
- Environmental benefits:
  - Achieves equal or greater reduction of pollution for the same or less cost

- Creates an economic incentive for dischargers to go beyond minimum pollution reduction and also encourages pollution prevention and the use of innovative technologies
- Can reduce cumulative pollutant loading, improve water quality, accommodate growth, and prevent future environmental degradation
- Can address the broader environmental goals within a trading area (e.g., ecosystem protection, ecological restoration, improved wildlife habitat, endangered species protection)

- Social benefits:
  - Encourages dialogue among stakeholders
  - Fosters concerted and holistic solutions for watersheds with multiple sources of water quality impairment.

TYPES OF TRADING

Below are the types of trading that EPA approves:

- *Trading to maintain water quality standards.* Trading may be used to maintain high water quality in waters where water quality standards are attained, such as by compensating for new or increased discharges of pollutants.
- *Pre-TMDL trading in impaired waters.* Pre-TMDL trading in impaired waters can be used to achieve progress toward or the attainment of water quality standards. It can be accomplished by individual trades that achieve a net reduction of the pollutant traded or by watershed-scale trading programs that reduce loadings to a specified cap supported by baseline information on pollutant sources and loadings. Trades also can be made that achieve a direct environmental benefit relevant to the conditions or causes of impairment to achieve progress toward restoring designated uses where reducing pollutant loads alone is not sufficient or as cost-effective. However, if the pre-TMDL trading does not result in the attainment of applicable water quality standards, a TMDL will be developed. After the TMDL has been approved, the reductions made to generate credits for pre-TMDL trading may no longer be adequate to generate credits under the TMDL. This will depend on the remaining level of reduction needed to achieve water quality standards and, where applicable, the allocation of point and non-point source pollutant loads established by the TMDL.
- *TMDL trading.* Trades and trading programs in impaired waters for which a TMDL has been approved or established by EPA should be consistent with the assumptions and requirements upon which the TMDL is established.

- *Intra-plant trading.* A point source pollutant discharge is allocated among a single facility's outfalls in a cost-effective manner, provided that the combined permitted discharge with trading is no greater than the combined permitted discharge without trading in the watershed.

- *Pretreatment trading.* An indirect industrial point source(s) that discharges to a publicly owned treatment works arranges, through the local control authority, for additional control by other indirect point sources beyond the minimum requirements in lieu of upgrading its own treatment for an equivalent level of reduction.

How EPA Encourages Trading

EPA has developed a handbook, *Water Quality Trading Assessment Handbook: Can Trading Help Advance Your Watershed's Goals?*, to help potential traders evaluate whether the circumstances in their watershed make it likely or unlikely that trading can be effectively implemented on a watershed basis to address existing water quality problem(s). The handbook can be accessed at www.epa.gov/owow/watershed/trading/handbook.

Who Can Participate in Effluent Trading

To take advantage of trading, you must have a point source that is in compliance, and that remains in compliance, with applicable technology-based limits. Intra-plant trades also must have a technology-based floor, while the technology floor for pretreatment trading is determined by the categorical standards. EPA expects that most trades will be covered by TMDL or similar watershed-based analysis.

The items you can trade are the pollutant reductions or water quality improvements. Under trading, a source that can more cost-effectively achieve greater pollutant reduction than is otherwise required would be able to sell or barter the credits for its excess reduction to another source unable to reduce its own pollutants as cheaply. To ensure that water quality standards are met throughout a watershed, an equivalent or better water pollutant reduction would need to result from a trade.

DoD Encroachment/Watershed Management Opportunities

Many installations are grappling with how to maintain a sustainable installation while combating the effects of incompatible land use, population growth pressures, environmental regulations, and endangered species requirements—all of which affect watershed quality. The more pressure that is placed on natural resources and water supplies from surrounding neighborhoods, the more of a problem it is for an installation to sustain its mission.

Encroachment effects are local, installation-specific issues. However, as encroachment broadly affects training and installation operations, it becomes a DoD-wide issue. Each installation must develop relationships with its neighbors to address regional growth and land use. DoD has developed resources to help installations address encroachment. They also can be resources for watershed management. The following section provides an overview of the innovative resources.

FY03 NDAA Section 2811 "Agreements to Limit Encroachments and Other Constraints on Military Training, Testing, and Operations"

Congress recently acknowledged the threat of encroachment to military readiness and provided legislative authority that allows the military services to work with government or private partners to establish buffer areas around active ranges and training lands. These authorities were enacted in Sections 2811 and 2812 of the FY03 National Defense Authorization Act, and they are now codified at Title 10, U.S.C. Sections 2684a and 2694a.

The revised Title 10 U.S.C. 2684a allows military services to enter into cooperative partnering agreements with eligible entities to address the use or development of real property in the vicinity near a military installation. These agreements are intended to address the adverse effects of encroachment at military installations by

- limiting land use or development that is incompatible with the installation's mission, or
- preserving a habitat on the property to relieve current or anticipated environmental restrictions that interfere with military activities at the installation.

Under the Constitution, only Congress has the authority to acquire land for the United States. Accordingly, any land acquisition by the military departments must be expressly authorized by law. Title 10 U.S.C. 2684a gives legal authority for military departments (specifically the secretary of each department) to enter into these particular types of cooperative agreements with eligible entities.

The cooperative agreement process facilitates establishing buffer areas to protect the current and future mission requirements and operational areas through cooperative partnering agreements. Compatible land-use buffer areas designated for limited development adjacent to active installation ranges protect endangered species and habitats and reduce issues associated with noise, dust, and safety. The partner also can acquire water rights as part of the agreements. Partnering with other levels of government or private conservation organizations leverages available resources to help achieve common objectives.

The cooperative agreements provide a cost-effective solution to buffering active ranges without having to undertake the lengthy land acquisition process. They allow DoD funds to be combined with funds from other partnering organizations to acquire property, easements, or development rights. The long-term costs to the military are further reduced because the partner(s) holds title to the land and also assumes land management responsibilities. The cooperative agreements are also an important component of local and regional growth management and conservation plans as they apply service funds toward helping the partner organizations realize their goals to acquire land for permanent conservation purposes.

For example, the Army implements the new authority of Title 10 U.S.C. §2684a with a May 19, 2003, policy memorandum from the HQDA Deputy Chief of Staff, G-3 Director of Training and Assistant Chief of Staff for Installation Management, "Army Range and Training Land Acquisitions and Army Compatible Use Buffers." Buffer spaces established through cooperative agreements using this policy are called Army Compatible Use Buffers (ACUBs). The ACUB program also manages cooperative agreements entered into under the Army's Private Lands Initiative. Contact your regional office for further information on your service's 2811 efforts.

Joint Land Use Study

DoD initiated the Joint Land Use Study (JLUS) program in 1985 to build on the successes of the Air Force and Navy Air Installation Compatible Use Zone and Army Installation Compatible Use Zone programs. Its objective is to ensure that future community growth and development is compatible with the installation's training or operational mission. To do this, the Office of Economic Adjustment provides community grants for JLUS projects to establish cooperative land-use planning processes between military installations and surrounding communities and to seek ways to reduce the military operational impacts on adjacent lands. This initiative strengthens and increases an installation's ties to its local communities and region. For more information, see http://www.oea.gov/oeaweb.nsf/Home?OpenForm.

Appendix A
Forms 1–4

A CD is provided to view Forms 1–4 in Appendix A.

Appendix B
Laws Affecting Watershed Management

This appendix provides a summary (and links to additional information) of key federal laws governing water resources (http://www.epa.gov/win/law.html and http://www.stormwaterauthority.org/regulatory%5Fdata/default.aspx) in the United States that provide the basis for watershed protection activities, as well as information that can be used for protecting a watershed. Table B-1 lists the laws, policies, and plans. For each item, we provide a summary of the legislation, its impact or relationship with watershed planning, and links to additional information.

Table B-1. Federal Laws, Policies, and Plans Related to Watershed Management and Non-Point Source Regulations

Category	Title
Federal laws	Clean Water Act (CWA) and amendments
	Part 130 of Title 40 of the Code of Federal Regulations Water Quality Planning and Management
	Safe Drinking Water Act (SDWA) and amendments
	Coastal Zone Management Act of 1972 (CZMA)
	Clean Air Act (CAA) and amendments
	Comprehensive Environmental Restoration, Compensation and Liability Act (CERCLA)
	Emergency Planning and Community Right-to-Know Act (EPCRA)
	Endangered Species Act (ESA)
	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
	Resource Conservation and Recovery Act (RCRA)
	Toxic Substances Control Act (TSCA)
Policies and plans	EPA's National Water Program Strategic Plan 2004 - 2008, April 2004
	EPA's Watershed-Based NPDES Permitting Policy, January 2003
	EPA Memo, Committing EPA's Water Program to Advancing the Watershed Approach, December 2002
	EPA's Draft Watershed-Based NPDES Permitting Implementation Guidance, August 2003
Executive orders	13148, Greening the Government Through Leadership in Environmental Management
	13112, Invasive Species
	13093, American Heritage Rivers
	12902, Energy Efficiency and Water Conservation at Federal Facilities
	12088, Federal Compliance with Pollution Control Standards

Table B-1. Federal Laws, Policies, and Plans Related to Watershed Management and Non-Point Source Regulations

Category	Title
	11990, Protection of Wetlands
	11988, Floodplain Management
	11593, Protection and Enhancement of the Cultural Environment
	11288, Prevention, Control, and Abatement of Water Pollution by Federal Activities
	11514, Protection and Enhancement of Environmental Quality
DoD memo of understanding	MOU to Foster the Ecosystem Approach
	MOU Between the U.S. Environmental Protection Agency and the U.S. Department of Defense with Respect to Integrated Pest Management

MAJOR FEDERAL LAWS

Clean Water Act

The federal Water Pollution Control Act, or CWA (full text can be located at http://www.epa.gov/win/law.html), is the principal law governing pollution in the nation's streams, lakes, and estuaries. Originally enacted in 1948, it was totally revised by amendments in 1972 (P.L. 92-500) that gave the act its current form and spelled out ambitious programs for water quality improvements that are now being put in place by industries and cities. Congress made certain fine-tuning amendments in 1977 (P.L. 95-217) and 1981 (P.L. 97-117).

The CWA prohibits the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permitting program is designed to track point sources, monitor the discharge of pollutants from specific sources to surface waters, and require the implementation of the controls necessary to minimize the discharge of pollutants.

Initial efforts to improve water quality under the NPDES program primarily focused on reducing pollutants in industrial process wastewater and discharges from municipal sewage treatment plants. As pollution control measures for managing these sources were implemented and refined, studies showed that more diffuse sources of water pollution were also significant causes of water quality impairment; specifically, stormwater runoff draining large surface areas, such as agricultural and urban land. This lead the EPA to adopt a watershed approach based on determining the total maximum daily load (TMDL) of a particular pollutant that a waterbody can accept and still meet its water quality standards.

THE BASIS FOR WATERSHED MANAGEMENT EFFORTS—WATER QUALITY STANDARDS AND TOTAL MAXIMUM DAILY LOADS

EPA's TMDL program is the main driver behind the adoption of watershed approaches to managing water issues. Under CWA Section 303(d), states are required to identify waters that do not meet water quality standards—even after the implementation of nationally required levels of pollution control technology. The law further requires states to develop TMDLs (with oversight from EPA) and establish a priority ranking for the identified impaired waters. These TMDLs allocate pollutant loadings among pollution sources in a watershed and provide a basis for identifying and establishing controls to reduce both point source and NPS pollutant loadings.

Water quality standards are a fundamental component of the CWA and, specifically, watershed management. These standards are adopted by states and tribes to protect public health; restore chemical, physical, and biological integrity of waters; and provide water quality for the protection and propagation of fish and wildlife and for recreation ("fishable/swimmable"). Standards consider the use and value of state and tribal waters for public water supplies, agricultural and industrial purposes, and navigation. Water quality standards depend on the designated uses of the water body and are based on water quality criteria established by EPA.

State TMDL programs are required to use all "existing and readily available" information in developing CWA Section 303(d) lists. This information may include source water assessments and ESA information. For example, since TMDLs are developed for specific pollutants or stressors, identification of these pollutants as a result of a source water assessment could provide an important indicator to states for verifying the need for developing a TMDL.

Section 303(d) lists identify waters not meeting water quality standards because of a particular pollutant or stressor. This type of information is helpful for identifying contaminants of concern for watersheds and source waters (refer to EPA's website—http://www.epa.gov/owow/tmdl/—for 303(d) lists, by state, of impaired waters). TMDLs for particular waterbodies generally provide more detailed information about the sources of the pollution and can be used to develop allocation scenarios for pollutant loadings among pollution sources in a watershed.

State TMDL programs are generally managed by state water quality agencies. At the local level, a variety of stakeholders may be involved including local and regional governing agencies, point sources, farmers, foresters, land developers, city and state planners, and local environmental organizations. For the latest status on the federal TMDL program, visit EPA's website—http://www.epa.gov/owow/tmdl/.

MANAGING STORMWATER DISCHARGES THROUGH NPDES PERMITS

The 1987 amendments to the CWA mandated that EPA develop a tiered implementation strategy for the NPDES Stormwater Program. The second phase of the strategy was the Final Stormwater Phase II Rule, which was signed by Administrator Browner on October 29, 1999 and published in the *Federal Register* on December 8, 1999. The rule regulates two classes of storm water dischargers on a nationwide basis:

- Operators of small MS4s located in urbanized areas as defined by the Bureau of the Census (termed a "regulated" small MS4). A "small" MS4 is any MS4 not already covered by Phase I of the NPDES stormwater program. Waivers from coverage are available.

- Operators of construction activities that disturb equal to or more than 1 and less than 5 acres of land. Waivers from coverage are available.

Additional small MS4s (outside of urbanized areas) and construction sites (disturbing less than 1 acre of land), along with other sources that are significant contributors of pollutants to U.S. waters (e.g., as identified via a TMDL process), may be brought into the NPDES Stormwater Program by the NPDES permitting authority.

Operators of Phase II regulated small MS4s and small construction activities are required to apply for NPDES permit coverage (most under a general rather than an individual permit) and implement stormwater discharge management controls (often referred to BMPs) that effectively reduce or prevent the discharge of pollutants into receiving waters.

The Phase II rule also revised the Phase I stormwater regulation. Specifically, EPA revised the original no exposure provision, found at 40 CFR 122.26(b)(14), to be a conditional exclusion. This conditional exclusion applies to all categories of industrial activity (except construction activity) with no exposure of industrial materials and activities to storm water. The Phase II revision, found at Section 122.26(g), requires industrial operators claiming no exposure to submit written certification that a condition of no exposure exists at their facility/site. The final rule includes a *No Exposure Certification Form* that is intended to serve as the required written certification in areas where EPA is the NPDES permitting authority. For more information concerning the no exposure revision, see the Stormwater Phase II Rule: Conditional No Exposure Exclusion for Industrial Activity fact sheet (EPA Stormwater Phase II Fact Sheet 4.0), or the Guidance Manual for Conditional Exclusion from Storm Water Permitting Based on "No Exposure" of Industrial Activities to Storm Water.

More information can be obtained by downloading the full text of the rule, fact sheets, and other guidance (cfpub.epa.gov/npdes/stormwater/swphases.cfm), by calling EPA's Stormwater Phase II Rule Hotline at 202-260-5816, or by sending an e-mail to sw2@epa.gov.

NONPOINT SOURCE CONTROLS

Section 319 of the CWA delegates the regulation of Nonpoint Source (NPS) pollution to the states and establishes the Nonpoint Source Management Program. EPA recognized the need for greater federal leadership to help focus state and local NPS efforts. Under Section 319 of the 1987 CWA amendments, states are

- required to conduct statewide assessments of their waters to identify those that were either impaired (did not fully support state water quality standards) or threatened (presently meet water quality standards but are likely not to continue to meet water quality standards fully) because of NPS pollution;
- required to develop NPS management programs to address the impaired or threatened waters identified in their non-point assessments; and
- entitled to receive annual grants from EPA to assist them in implementing their NPS management programs once EPA had approved the assessments and programs.

Although Section 319 does not include an enforcement mechanism to ensure that states actually develop and implement programs, CWA Section 303 requires that states identify all activities that cause a waterbody to be impaired—including NPS—and develop mitigation plans. This provision enables the states to regulate the runoff from NPS of pollution. These requirements are explained in the Proposed Federal Consistency Guidelines, which can be downloaded from the EPA website at http://www.epa.gov/owow/nps/Section319/319guide03.html.

State NPS pollution control programs vary considerably. Most states encourage landowners to adopt voluntary NPS control methods. Some states, including North Carolina, New Jersey, Hawaii, and Washington, require consideration of NPS through detailed erosion control plans and implementation of BMPs for ground-disturbing activities. North Carolina, for example, requires erosion control plans 30 days before any land-disturbing activities are started. Other states have empowered local jurisdictions to create and enforce their own erosion control measures.

WETLANDS PROGRAM

Section 404 of the CWA, which is administered by the U.S. Army Corps of Engineers, establishes a program to regulate the discharge of dredged or fill material into U.S. waters. While the Section 404 program regulates the discharge of dredged or fill material on a case-by-case basis, provisions found within this authority can allow for the regulation of aquatic resources in a more comprehensive manner. Some examples include watershed planning, special area management planning, and advanced identification.

EPA's wetlands program attempts to integrate wetlands protection into existing EPA programs (e.g., CWA). In addition, some states have developed or are developing State Wetlands Conservation Plans to provide a framework for integrating wetland programs across many state programs. EPA's wetlands program has experience in providing assistance for the development of comprehensive wetlands plans, participating in efforts to develop such plans, and reviewing plans for other state and local programs.

Wetland protection programs often need to assess the overall health of watershed ecosystems in order to estimate the impacts of proposed man-made changes. Assessments undertaken by federal, state, and local governments for protecting wetlands can provide information that may be useful for watershed assessments.

Wetlands can provide a wide range of different functions and benefits to local communities, including the interception and filtration of pollutants, thereby improving source water quality and possibly reducing treatment costs. Constructed wetlands can improve source water quality for downstream rivers. Integrating wetlands protection and restoration into watershed programs can highlight the importance of targeting wetlands as high priority areas for protection and can reduce duplication of efforts and conflicting actions.

More information is available at http://www.epa.gov/owow/wetlands/.

SPILL PREVENTION, CONTROL, AND COUNTERMEASURE REQUIREMENTS

The CWA also includes provisions to prevent spills of certain substances from reaching navigable waters. Section 311 of the CWA provides EPA and the U.S. Coast Guard with the authority to establish a program for preventing, preparing for, and responding to oil spills that occur in navigable waters of the United States. EPA implements provisions of Section 311 of the CWA through a variety of regulations, including the National Contingency Plan and the Oil Pollution Prevention regulations.

As a cornerstone of its strategy to prevent oil spills from reaching our nation's waters, the EPA requires that certain facilities develop and implement oil spill

prevention, control, and countermeasures (SPCC) plans. Unlike oil spill contingency plans that typically address spill cleanup measures after a spill has occurred, the goal of an SPCC plan is to ensure that facilities put in place containment and other countermeasures to prevent oil spills from reaching navigable waters.

Under EPA's Oil Pollution Prevention regulation, facilities must detail and implement spill prevention and control measures in their SPCC plans. A spill contingency plan is required as part of the SPCC plan if a facility is unable to provide secondary containment (e.g., berms surrounding the oil storage tank). These plans are an essential element of a watershed impact analysis and a source water impact analysis because they list the types, quantities, and spill controls for oils and hazardous substances stored at municipal facilities.

Spills are also regulated under the Oil Pollution Act (OPA). The OPA was signed into law in August 1990, largely in response to rising public concern following the Exxon Valdez incident. The OPA increased penalties for regulatory noncompliance, broadened the response and enforcement authorities of the federal government, and preserved state authority to establish laws governing oil spill prevention and response.

Safe Drinking Water Act

Section 1453 of the Safe Drinking Water Act (SDWA), as amended in 1996, requires all states to complete assessments of their public drinking water supplies. By 2003, each state and participating tribe will delineate the boundaries of areas in the state (or on tribal lands) that supply water for each public drinking water system, identify significant potential sources of contamination, and determine how susceptible each system is to sources of contamination.

These drinking water source protection areas include federal lands that support non-federally owned public water systems (PWSs) as well as non-federal lands that support federally owned PWSs. For each area, the source water assessments synthesize existing information about the sources of each drinking water supply to provide a national baseline on the potential contaminant threats and help guide future watershed restoration and protection. Source water protection plans and wellhead protection are discussed in the following subsections.

Source Water Protection Plans

The SDWA amendments of 1996 required states to develop Source Water Assessment and Protection (SWAP) programs. A SWAP program includes a strategic approach to conducting the source water assessments, delineates the area of influence from which a contaminant may enter a PWS, inventories sources of potential or known contaminants within the delineated zone, and determines the susceptibility of a PWS to such contaminants.

Information needed for source water assessments may be available from watershed assessments conducted for other programs (such as TMDL assessments). SWAPs can be integrated into other watershed protection efforts like point and NPS pollution control, wetlands protection, waste management, air pollution, and pesticide management. This integration of efforts will allow various watershed stakeholders to look for opportunities to leverage limited resources to meet common goals. For more information about SWAP, see http://www.epa.gov/owow/watershed/.

Wellhead Protection Program

The SDWA amendments of 1986 (P.L. 99-339) established the Wellhead Protection (WHP) program to protect the recharge areas of PWS wells from all sources of contamination. Like the SWAP, the WHP provides information municipalities need to develop an overall watershed baseline impact assessment.

Underground Injection Control Program

If the regulator finds that an underground injection activity, such as a leaky septic system, is contributing to surface water quality concerns, the regulator can impose restrictions on the activity to prevent further environmental degradation.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act was amended through the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 and P.L. 104-150, and the Coastal Zone Protection Act of 1996. In 1990, as part of the CZARA, Congress required the 29 states with federally approved Coastal Zone Management Act programs to develop coastal NPS programs. These programs provide for implementation within coastal watersheds of management measures specified by EPA and incorporate policies and mechanisms, enforceable at the state level, to ensure implementation of the specified measures. EPA and the National Oceanic and Atmospheric Administration (NOAA) jointly approve the programs. For more information, see http://www.ocrm.nos.noaa.gov/czm/.

Estuaries and Clean Waters Act of 2000

The Estuaries and Clean Waters Act of 2000 (Section 835) establishes a program to leverage federal, state, and private funding to support watershed restoration projects that are proposed at the local level. The Act reauthorizes the National Estuary Program, the Chesapeake Bay Program, the Long Island Sound Program, and the Clean Lakes Program, and authorizes pilot programs of alternative water sources, a Lake Ponchatrain restoration program and funds for the cleanup of the Tijuana River near San Diego.

Under the Act, all Chesapeake Bay agreements are now codified. What this means is that all agreements that DoD has signed are now law. Under the Act, federal agency's that "owns or operates a facility (as defined by the administrator) within the Chesapeake Bay watershed shall participate in regional and sub-watershed planning and restoration programs." In addition, "the head of each federal agency that owns or occupies real property in the Chesapeake Bay watershed shall ensure that the property, and actions taken by the agency with respect to the property, comply with the Chesapeake Bay Agreement, the Federal Agencies Chesapeake Bay Unified Plan, and any subsequent agreements and plans." Last by 2010, the Chesapeake Bay watershed must be off the impaired waters list or it will be subject to TMDL requirements. What this may mean is stricter discharge limits.

The Act also establishes a national goal of restoring one million acres of estuary habitat by 2010 and authorizes a total of $275 million over the next 5 years for matching funds for local estuary habitat restoration projects. It also establishes an Estuary Habitat Restoration Council that is responsible for developing a National Habitat Restoration Strategy within 1 year and for reviewing and establishing funding priorities among restoration projects. EPA serves on the Council, which is chaired by the U.S. Army.

Sikes Act

The Sikes Act, Public Law 99-561, Title 16 U.S.C. 670a–670f, as amended on November 18, 1997, requires installations to manage natural resources via an approved Integrated Natural Resource Management Plan. This plan serves as the installation plan for managing its ecosystems to include watersheds and wetlands. For full text on the Sikes Act, see http://www4.law.cornell.edu/uscode/16/670.html.

Other Federal Laws

Clean Air Act

The CAA requires the prevention or control of air pollution from stationary and mobile sources. The CAA includes provisions for control of air toxins, acid rain, chloroflourocarbons (CFCs), and halons. It provides for a national air quality permit program and increased enforcement.

CAA permits and air emissions inventories of stationary sources can assist in watershed planning by quantifying material that can enter the watershed via air deposition. These emission inventories provide excellent information about the sources of watershed pollutants that may be coming from air deposition.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—also known as the Superfund law—regulates the cleanup of leaking hazardous waste disposal sites. It also establishes liability for hazardous substance releases—producing facilities are liable for cleanup of their releases and restitution costs. Furthermore, states may identify clean up of these sites as applicable or relevant and appropriate requirements for its water quality standards.

At the installation, restoration planning (CERCLA) documents provide a list and description of sites that are slated for restoration at the installation. Installations conducting a watershed baseline impact study should consider these sites as they may contribute, via runoff or ground water, to the impairment of a particular waterbody. Furthermore, installations should be aware that states may revise an installations closure plan to establish stricter discharge limits if that site is identified as an activity causing an impairment to a waterbody.

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW ACT

The Emergency Planning and Community Right to Know Act (EPCRA) requires personnel to participate in the emergency planning process. If a site has extremely hazardous substances (EHS) above its threshold planning quantities, EPCRA requires the site to notify and provide information to the local emergency planning committees (LEPCs) and state emergency response commissions (SERCs). The site must notify the SERCs and LEPCs if a CERCLA hazardous substance or EHS is released.

EPCRA requires that site managers provide information to emergency planners and the public on hazardous substances used at the site, including the hazards posed by these chemicals and how they are handled onsite. A toxic release inventory (TRI) of toxic chemical releases must be conducted and submitted annually to EPA and the appropriate state agency (TRI Form R). This report must include information on the release and off-site transfer of toxic chemicals.

EPCRA documents provide excellent information about the location of stored hazardous materials that should be incorporated into a watershed impact assessment document.

ENDANGERED SPECIES ACT

The Endangered Species Act (ESA), 16 U.S.C. 1531 et seq., was enacted in 1973. The ESA establishes a procedural framework, substantive mandates, and prohibitions to ensure that it conserves species federally listed as threatened and endangered (T&E). Under the substantive mandates, a person is prohibited from

undertaking actions that are likely to jeopardize a federally listed T&E species, destroy or adversely modify the designated critical habitat of such a species, or "take," without authorization, a listed T&E species.

FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT

The DoD pest management program incorporates compliance and best management practices in an effort to ensure effective pest control with the least risk to the environment. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (see 7 U.S.C. 136 as amended) and the Food Quality Protection Act of 1996 were promulgated to protect citizens from hazardous effects of pesticides. Enforcement authority for FIFRA rests with the EPA, which regulates the production, distribution, storage, use, and disposal of pesticides within the United States. (See 40 CFR parts 150–171.) FIFRA requirements that most influence current operations at municipalities are found in 40 CFR Part 171, which specifies certification requirements for pesticide applicators. FIFRA regulations for pesticide storage and disposal in 40 CFR 165 (subparts C and D) have been deleted and are superseded in part by regulations enacted under the RCRA.

DoD pest management policy calls for an environmentally sound integrated pest management (IPM) program using best pest control practices. IPM was endorsed as one of the objectives of DoD's Comprehensive Pollution Prevention Strategy, a major policy directive signed by the Secretary of Defense (August 11, 1994) to implement Executive Orders 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention*; 12873, *Federal Acquisition, Recycling and Waste Prevention*; and 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. This DoD strategy established a goal of reducing pesticide use 50 percent by the end of FY00 using FY93 as the baseline. Also, this policy requires that all DoD installations have approved pest management plans and all personnel (DoD and contractor) who apply pesticide on DoD installations are appropriately certified. The IPM plan will provide the amounts of pesticides applied at an installation.

FY03 NATIONAL DEFENSE AUTHORIZATION ACT SECTIONS 2811 AND 2812

The foundation of operational readiness is highly trained soldiers. To conduct tough, realistic training, commanders require continued access to critical ranges and training lands. Encroachment from population growth, urban development and environmental requirements limits the military's ability to fully utilize installations for realistic, combat training. To address these issues, DoD is pursuing sustainable approaches to buffering ranges and installations from surrounding growth, and balancing environmental mandates with readiness imperatives.

Congress recently acknowledged the threat of encroachment to military readiness and provided legislative authority that allows the services to work with government or private partners to establish buffer areas around active ranges and training

lands. These authorities were enacted in sections 2811 and 2812 of the FY03 National Defense Authorization Act (NDAA), and are now codified at Title 10, U.S.C. Sections 2684a and 2694a.

The FY03 NDAA Section 2811, *Agreements to Limit Encroachments and Other Constraints on Military Training, Testing, and Operations*, amends 10 U.S.C. 2684a. The revised 10 U.S.C. 2684a allows military services to enter into cooperative agreements with eligible entities to address the use or development of real property near a military installation. These agreements are intended to address the adverse effects of encroachment at military installations by

- limiting land use or development that is incompatible with the installation's mission, or
- preserving habitat on the property to relieve current or anticipated environmental restrictions that interfere with military activities at the installation.

The FY03 NDAA Section 2812, *Conveyance of Surplus Real Property for Natural Resource Conservation Purposes*, amends 10 U.S.C. §2694a. The revised 10 U.S.C. §2694a allows military services to convey surplus real property to eligible entities for conservation purposes. Conveyances of surplus real property for conservation purposes are conducted in accordance with the requirements of 40 U.S.C. 471 *et seq.*, *Federal Property and Administrative Services Act of 1949* as amended. For the Army, these requirements are detailed in AR 405-70, *Utilization of Real Property* and AR 405-90 *Disposal of Real Estate*.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

NEPA sets forth a national charter for environmental protection to include establishing a Council on Environmental Quality (CEQ) to advise the President on the condition of the nation's environment and resources. The CEQ implements the parts of NEPA applying to federal agencies through regulations issued at 40 CFR Parts 1500–1508. NEPA, through the CEQ regulations, provides procedures for federal agencies to consider impacts on the environment in decision making and planning. NEPA requires federal agencies to use an interdisciplinary approach to analyze and address significant environmental impacts from policies, programs, plans, and activities. Federal agencies are required to document these environmental analyses and seek advice, participation, or comment from appropriate governmental agencies, and inform interested public and private organizations. These analyses include many aspects covering land use, air and water quality, wildlife and their habitats, socioeconomic factors, human health and safety, and natural and historical resources.

Although NEPA should not come into play when installations decide to conduct watershed assessments, NEPA documents may provide valuable sources of information.

RESOURCE CONSERVATION AND RECOVERY ACT

RCRA, 42 U.S.C. 6901 et seq., was enacted by Congress in 1976 as a comprehensive regulatory program for the management of hazardous waste (HW) from "cradle to grave." Under RCRA, HW is treated, stored, and disposed of in ways that minimize risk to human health and the environment. RCRA has been amended several times since its enactment, most importantly by the Hazardous and Solid Waste Amendments of 1984 (HSWA). The HSWA mandated changes to RCRA, such as HW minimization, land disposal restrictions, and provisions for regulation of underground storage tanks (USTs) that contain petroleum products or hazardous substances. HSWA provides management and technical standards for generators and transporters of HW and for owners and operators of treatment, storage, and disposal (TSD) facilities and USTs.

At the installation, RCRA operating permits and closure plans provide a list and description of sites that have discharges to ground water, surface water, and to air. Installations conducting a watershed baseline impact study should consider these sites as they may contribute, via runoff or ground water, to the impairment of a particular waterbody. Furthermore, installations should be aware that states may revise an installations RCRA operating permit or closure plan to establish stricter discharge limits if that site is identified as an activity causing an impairment to a waterbody.

TOXIC SUBSTANCES CONTROL ACT

The Toxic Substances Control Act (TSCA), 15 U.S.C. 2601 et seq., authorizes EPA to screen existing and new chemicals used in manufacturing and commerce to identify potentially dangerous products or uses that should be subject to federal control. As enacted, TSCA also included a provision requiring EPA to take specific measures to control the risks from polychlorinated biphenyls (PCBs) [Section 6(e)]. Subsequently, three titles have been added to address concerns about other specific toxic substances—asbestos in 1986 (Title II, P.L. 99-519), radon in 1988 (Title III, P.L. 100-551), and lead in 1992 (Title IV, P.L. 102-550).

EPA may require manufacturers and processors of chemicals to conduct and report the results of tests to determine the effects of potentially dangerous chemicals on living things. Based on test results and other information, EPA may regulate the manufacture, importation, processing, distribution, use, and/or disposal of any chemical that presents an unreasonable risk of injury to human health or the environment. A variety of regulatory tools are available to EPA under TSCA ranging in severity from a total ban on production, import, and use to a requirement that a product bears a warning label at the point of sale. TSCA directs EPA to use the least burdensome option that can reduce risk to a level that is reasonable given the benefits provided by the chemical product or process.

EXECUTIVE ORDERS

EO 13148, Greening the Government Through Leadership in Environmental Management

Section 207 of EO 13148 deals with environmentally and economically beneficial landscaping on federal facilities. Each agency must strive to promote the sustainable management of federal facility lands through the implementation of cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts on the natural environment. For complete text of the EO, see http://www.denix.osd.mil/denix/Public/Legislation/EO/note72.html. A DENIX user account is required.

EO 13112, Invasive Species

EO 13112, Invasive Species, requires each federal agency whose actions may affect the status of invasive species to identify such actions to the extent practicable and permitted by law and, subject to the availability of appropriations, use relevant programs and authorities to

- prevent the introduction of invasive species;
- detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner;
- monitor invasive species populations accurately and reliably;
- provide for restoration of native species and habitat conditions in ecosystems that have been invaded;
- conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species;
- promote public education on invasive species and the means to address them; and
- not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species, and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

See http://www.denix.osd.mil/denix/Public/Legislation/EO/note48.html for complete text of the EO. A DENIX user account is required.

EO 13093, American Heritage Rivers

EO 13093, American Heritage Rivers, amends EOs 13061 and 13080. The American Heritage Rivers initiative has three objectives: natural resource and environmental protection, economic revitalization, and historic and cultural preservation. To the extent permitted by law and consistent with their missions and resources, executive agencies are to coordinate federal plans, functions, programs, and resources to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage. See http://www.denix.osd.mil/denix/Public/Legislation/EO/toc.html for complete text of EOs 13093, 13061, and 13080. A DENIX user account is required.

Other Related Executive Orders

The following executive orders provide supporting policies and guidance related to watershed assessment and protection activities:

- EO 12902, Energy Efficiency and Water Conservation at Federal Facilities
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- EO12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements
- EO 11988, Floodplain Management
- EO11288, Prevention, Control, and Abatement of Water Pollution by Federal Activities
- EO 11593, Protection and Enhancement of the Cultural Environment
- EO 11514, Protection and Enhancement of Environmental Quality
- EO 11990, Protection of Wetlands
- EO 11288, Prevention, Control, and Abatement of Water Pollution by Federal Activities.

See http://www.denix.osd.mil/denix/Public/Legislation/EO/toc.html for complete text of the executive orders. A DENIX user account is required.

DoD Memorandums of Understanding

Memorandum of Understanding to Foster the Ecosystem Approach

The Memorandum of Understanding (MOU) was signed in 1995 by 14 federal agencies, including DoD and EPA. The signatories should provide leadership in and cooperate with activities that foster the ecosystem approach to natural resource management, protection, and assistance. Federal agencies should ensure that they utilize their authorities in a way that facilitates, and does not pose barriers to, the ecosystem approach. Consistent with their assigned missions, federal agencies should administer their programs in a manner that is sensitive to the needs and rights of landowners, local communities, and the public, and should work with them to achieve common goals. A complete version of the MOU is available at http://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/MOA/DOD/note5.html. A DENIX user account is required.

In response to this MOU, DoD established the Strategic Environmental Research and Development Program (SERDP) Ecosystem Management Project (SEMP) in FY98 with two primary goals:

- Establish one or more sites on DoD facilities for long-term ecosystem monitoring
- Pursue ecosystem research activities relevant to sustaining DoD mission capabilities.

The overall program objective is to plan, coordinate, and manage, on behalf of SERDP, an ecosystem management project initiative that focuses on ecosystem science relevant to DoD ecosystem management concerns. For more information, see http://www.denix.osd.mil/denix/Public/Library/SEMP/semp.html.

MOU Between the U.S. Environmental Protection Agency and the U.S. Department of Defense with Respect to Integrated Pest Management

This MOU was signed in 1996 by DoD and EPA. Its purpose is to form a working partnership to promote environmental stewardship by Integrated Pest Management (IPM) strategies to reduce the potential risks to human health and the environment associated with pesticides. In the MOU, DoD agreed to the following items:

- Through coordination by the Armed Forces Pest Management Board, arrange suitable locations on DoD installations where innovative IPM techniques can be demonstrated to control pests.

- Where possible and practical, provide the necessary personnel and equipment to implement physical, mechanical, cultural, biological, educational, and other techniques, and to use less toxic pesticides such as biopesticides.

- Promote the use of IPM on DoD-controlled golf courses with the objective of eventually having all DoD courses practicing IPM.

The EPA also agreed, subject to the availability of funds, to fund (or co-fund with DoD) seed grants for selected IPM research projects to be performed on DoD installations. The grants will be jointly reviewed and selected by DoD and EPA to ensure that they are technically appropriate and conform to the statutory requirement to support or stimulate the accomplishment of a public purpose and not be for the exclusive use or sole benefit of the federal government.

Appendix C
References for Best Management Practices

The following references provide a wide variety of best management practices that you can review when developing solutions to your identified impacts to a watershed.

Title, description, reference, and WWW link	General			Best management practices					
	Planning	Monitoring and assessment	Indicators of performance	General applicability	Design information	Effectiveness	Cost information	Maintenance issues	Location case studies
American Society of Civil Engineers (ASCE) National Stormwater BMP Database at website http://www.bmpdatabase.org/. This website contains an online database of BMPs that users can search based on type, pollutant treated or location used. For most cases, it presents detailed information on the effectiveness of each urban BMPs in removing pollutants. The database only contains studies that conform to established protocols.				x	x	x	x	x	x
Center for Watershed Protection's Stormwater Manager's Resource Center (SMRC). The Stormwater Manager's Resource Center is designed specifically for stormwater practitioners, local government officials, and others that need technical assistance on stormwater management issues. Created and maintained by the Center for Watershed Protection, the SMRC has everything you need to know about stormwater in a single site http://www.stormwatercenter.net/. Also, the Center publishes the guide, titled *Watershed Protection Techniques*. Center for Watershed Protection, Silver Spring, MD. It can be ordered at http://www.cwp.org/.	x	x	x	x	x	x	x	x	x
U.S. EPA provides a website that contains a variety of stormwater and wastewater BMPs http://www.epa.gov/seahome/inject/src/gbest.htm.	x			x	x	x	x	x	
U.S. EPA, *Nonpoint Source Pollution from Urban Sources BMP Resources*, http://www.epa.gov/owow/nps/urban.html.	x	x	x	x	x	x	x	x	x
U.S. EPA, *National Management Measures to Control Nonpoint Source Pollution from Marinas and Recreational Boating*, http://www.epa.gov/owow/nps/mmsp/index.html.	x	x	x	x	x	x	x	x	x
U.S. EPA, *National Management Measures to Control Nonpoint Source Pollution from Agriculture*, Draft, http://www.epa.gov/owow/nps/agmm/index.html.	x	x	x	x	x	x	x	x	x
U.S. EPA, January 1993, *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters,* EPA 840-B-92-002, U.S. EPA, Office of Water, Washington, DC—NCEPI.	x	x	x	x	x	x	x	x	x

Title, description, reference, and WWW link	General			Best management practices					
	Planning	Monitoring and assessment	Indicators of performance	General applicability	Design information	Effectiveness	Cost information	Maintenance issues	Location case studies
U.S. EPA, 1998, Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures—Urban Field Test Version, EPA841-B-937-011. Helps local officials focus limited resources by establishing statistical sampling to assess, inspect, or evaluate a representative set of BMPs, erosion and sediment controls, and onsite wastewater treatment systems.	x	x	x	x	x	x	x	x	x
U.S. EPA, 1997, Monitoring Guidance for Determining Effectiveness of Nonpoint Source Controls, Final, EPA/841-B-96-004, U.S.EPA Nonpoint Source Control Branch, September - NCEPI. Addresses design of monitoring programs to assess water quality to determine impacts of nonpoint sources and effectiveness of practices used as controls.	x	x	x	x	x	x	x	x	x
Effects of Land Use Change on Hydrology and Nonpoint Source Pollution, Version 1.1, http://danpatch.ecn.purdue.edu/~sprawl/LTHIA2/.	x	x	x	x	x	x	x	x	x
Horner, R.R., J.J. Skupien, E.H. Livingston, and H.E. Shaver, August 1994, *Fundamentals of Urban Runoff Management: Technical and Institutional Issues,* Terrene Institute, Washington, DC, (in cooperation with U.S.EPA), (703) 548-5473.	x	x	x	x	x	x	x	x	x
Livingston, Shaver, Horner, and Skupien, May 1997, *Institutional Aspects of Urban Runoff Management: A Guide for Program Development and Implementation,* The Watershed Management Institute, Inc. (WMI), (in cooperation with USEPA), WMI, (850) 926-5310. A comprehensive review of the institutional framework of successful urban runoff management programs at city, county, regional, and state levels of government. Recommendations are provided (based on surveys) that can help in all aspects of urban runoff program development and management.	x	x	x	x	x	x	x	x	x
Municipal Technologies, http://www.epa.gov/owmitnet/mtb/mtbfact.htm.	x	x	x	x	x	x	x	x	x
Maryland Stormwater Management BMP Design Manual, http://www.mde.state.md.us/environment/wma/stormwatermanual/.	x	x	x	x	x	x	x	x	x
Maine Department of Environmental Protection Office of Coastal Zone Management, *Stormwater Management Handbook*, March 1997.	x	x	x	x	x	x	x	x	x
Natural Resources Defense Council, May 1999, *Stormwater Strategies: Community Responses to Runoff Pollution,* Natural Resources Defense Council, http://www.nrdc.org/water/pollution/storm/stoinx.asp.	x	x	x	x	x	x	x	x	x
Prince George's County, MD, Department of Environmental Resources Program and Planning Division, *Low Impact Development Design Strategies: An Integrated Design Approach*, January 2000.	x	x	x	x	x	x	x	x	x
Services and Departments, http://www.slac.stanford.edu/esh/epr/stormwater.BMP1.html.	x	x	x	x	x	x	x	x	x

Title, description, reference, and WWW link	General			Best management practices					
	Planning	Monitoring and assessment	Indicators of performance	General applicability	Design information	Effectiveness	Cost information	Maintenance issues	Location case studies
Terrene Institute, March 1996, *A Watershed Approach to Urban Runoff: Handbook for Decision-makers*. Terrene Institute, Washington, DC, (in cooperation with U.S.EPA Region 5), (703) 548-5473 or terriinst@aol.com. An informative primer for local decision makers and watershed organizations on assessing the water quality of watersheds, identifying contributing sources, and prioritizing watershed resources to implement effective nonstructural and structural BMPs. BMPs are summarized, and a list of resources to obtain additional information is provided.	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
U.S. Department of Agriculture. Award-winning interagency *Stream Corridor Restoration Handbook* www.usda.gov/stream_restoration.	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
U.S. Department of Agriculture. List of Agricultural Stormwater BMPs, http://www.ncg.nrcs.usda.gov/nhcp_2.html.	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
U.S. Natural Resources Conservation Service; various erosion control and streambank stabilization drawings, http://www.wa.nrcs.usda.gov/technical/eng/cad_support/standard_dwgs/index.html.	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
U.S. Geological Survey's website for its water quantity and water quality data (NAWQA), both archival and real-time, surface and ground water, http://water.usgs.gov/nwis.	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
U.S. Natural Resource Conservation Service, http://www.wa.nrcs.usda.gov/technical/eng/ Good concept designs and other engineering support material.	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
Army Corps of Engineers' Sustainability, Encroachment, and Room to Maneuver (SERM) program. Tools and approaches to help maintain the traditional and future operations planned for installations, http://www.cecer.army.mil/KD/SERM/index.cfm?chn_id=1063.	*x*								
Army Corps of Engineers Sustainable Installations Regional Resource Assessment, SIRRA Version 1a web-based analysis tool provides a first level screening intended to assist users in answering four types of questions related to sustainability using spatially related national data sets, https://ff.cecer.army.mil/ff/sirra.do.	*x*								

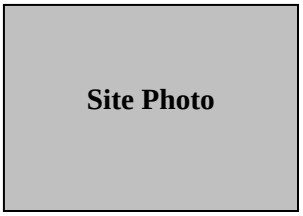
Appendix D
Sample Project Sheet Format

While it is important to document each activity's affects to mission and the watershed conditions, having the project information in separate locations makes it difficult to summarize the installation workplan efforts or to identify opportunities for coordinating watershed management efforts. Thus, this appendix contains the following recommended format for summary information, which users can use to enter their activity impact and project information for different management purposes such as prioritizing budget requests and tracking project implementation progress and results.

Project Title

Site Name

Installation Project Priority:



Location: (latitude and longitude, building number, or description)

Problem Description

Proposed Project Objective and Benefits

Proposed Project Concept Design

Design Concept

Maintenance Requirements

Permits and Legal Requirements

Proposed Budget and Schedule

Cost

Schedule

Cost Benefit Data

Proposed Funding Sources

EPR FUNDING PROPOSAL

Project XXX

Proposed EPR Classification Codes:

- Pillar:
- Fund Type:
- Law/Reg:
- ECAT:
- Class:

Other Potential Funding Sources

Potential Partners/ Stakeholders

Installation Responsible Office

Other Partners

Additional References

Technical Documents

POCs at other sites that have implemented similar projects